ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

30 North Michigan Avenue, Chicago 2, Illinois

OFFICIAL JOURNAL
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION
AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

Original contributions, exchanges and books for review should be forwarded to the Editorial Office. All business matters including advertising should be handled through the Executive Office, 30 N. Michigan Ave., Chicago 2, Illinois. The statements in the manuscripts published in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are made solely on the responsibility of the author. The American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are for exclusive publication and may not be published elsewhere.

OFFICERS

American Congress of Physical Medicine and Rehabilitation

ARTHUR C. JONES, M.D.
Portland, Ore., President
FREDERIC J. KOTTKE, M.D.
Minneapolis, President-Elect
DONALD A. COVALT, M.D.
New York, First Vice-President
DONALD J. ERICKSON, M.D.
Rochester, Minn., Second Vice-President
JEROME S. TOBIS, M.D.
New York, Third Vice-President
LOUIS B. NEWMAN, M.D.
Chicago, Fourth Vice-President
CHARLES D. SHIELDS, M.D.
Washington, D. C., Fifth Vice-President
FRANCES BAKER, M.D.
San Mateo, Calif., Secretary
FRANK H. KRUSEN, M.D.
Rochester, Minn., Treasurer
WALTER J. ZEITER, M.D.
Cleveland, Executive Director
DOROTHEA C. AUGUSTIN
Chicago, Executive Secretary

EXECUTIVE COUNCIL

Donald L. Rose, M.D., Kansas City, Kans., Chairman.
Norman E. Titus, M.D., Verona, N. J., Secretary.
Robert L. Bennett, M.D., Warm Springs, Ga.
William Bierman, M.D., New York.
Earl C. Elkins, M.D., Rochester, Minn.
Kristian G. Hansson, M.D., New York.
Abraham R. Hollender, M.D., Miami Beach, Fla.
O. Leonard Huddleston, M.D., Santa Monica, Calif.
H. Worley Kendell, M.D., Peoria, Ill.
Miland E. Knapp, M.D., Minneapolis.
A.B.C. Knudson, M.D., Washington, D. C.
Frank H. Krusen, M.D., Rochester, Minn.
Gordon M. Martin, M.D., Rochester, Minn.
Walter S. McClellan, M.D., Chapel Hill, N. C.
Fred B. Moor, M.D., Los Angeles.
William D. Paul, M.D., Iowa City.
Nathan H. Polmer, M.D., New Orleans.
William H. Schmidt, M.D., Philadelphia.
Wm. Benham Snow, M.D., New York.
Arthur L. Watkins, M.D., Boston.
Arthur C. Jones, M.D., Portland, Ore., Ex-officio.

Subscription— In the United States, its possessions, and Mexico, $7.00 yearly; Canada, $8.00; elsewhere, $14.00 the year; $0.75 per single copy; special issues $1.25 per single copy. Advertising rates on application. All advertising copy subject to acceptance by Publication Committee.

COPYRIGHT: Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission will be granted on request for reproduction in reputable publications if proper credit is given. Reproduction for commercial purposes will not be permitted.

Published monthly at Chicago, Illinois, by the American Congress of Physical Medicine and Rehabilitation. Entered as Second Class Matter at the Post Office at Chicago, Illinois.

Copyright 1959, by the American Congress of Physical Medicine and Rehabilitation.

EDITORIAL BOARD

PAUL A. NELSON, M.D., Cleveland, Chairman
ARTHUR C. JONES, M.D., Portland, Ore.
FREDERIC J. KOTTKE, M.D., Minneapolis
DONALD L. ROSE, M.D., Kansas City, Kans.
OSCAR O. SELKE, JR., M.D., Houston
JEROME S. TOBIS, M.D., New York
ARTHUR L. WATKINS, M.D., Boston

CONSULTANTS TO EDITORIAL BOARD

C. KNIGHT ALDRICH, M.D., Chicago
LENOX D. BAKER, M.D., Durham, N. C.
LEO BARTEMEIER, M.D., Baltimore
CYRIL COURVILLE, M.D., Los Angeles
ROBERT C. DARLING, M.D., New York City
OTTO GLASSER, Ph.D., Cleveland
JAMES G. GOLSETH, M.D., Pasadena, Calif.
W. HENRY HOLLINSHEAD, Ph.D., Rochester, Minn.
WILLIAM KUBICEK, Ph.D., Minneapolis
MEYER A. PERLSTEIN, M.D., Chicago

The ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is devoted to the publication of significant articles in this particular field. Contributions of interest to those in physical medicine and rehabilitation are invited. Articles are accepted only with the understanding that they are contributed exclusively to the ARCHIVES. Articles and accompanying illustrations become the property of the journal.

MANUSCRIPTS

Submit only the original copy of the article, but retain a copy for use in correcting galley proofs. Carbon copies are not acceptable for editing and typesetting purposes.

REFERENCES

References should be placed at the end of the manuscript and should conform to the style of the Quarterly Cumulative Index Medicus. No more than twenty references should be included with a manuscript.

ILLUSTRATIONS

Only reproducible illustrations will be accepted. All photographs must be black and white glossy prints, clear cut and contrasting. The size of each photograph submitted should be no larger than 2⅜″ x 2″. Instructions for combining photographs are acceptable. The Editorial Board reserves the right to limit the number and size of illustrations used with any manuscript submitted for publication. Any number of illustrations over three (3) is charged to the author.

REPRINTS

Reprint order blanks with a schedule of prices will be attached to galley proofs. Individual reprints of an article must be obtained direct from the author.

COPYRIGHT

Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission for reproduction must be directed to the Editorial Board.

Detailed information covering instructions for the preparation of manuscripts for publication may be had by writing direct to the Editorial Office, 30 N. Michigan Ave., Chicago 2.

PRINTED IN U.S.A.

SURE, SAFE, EFFECTIVE

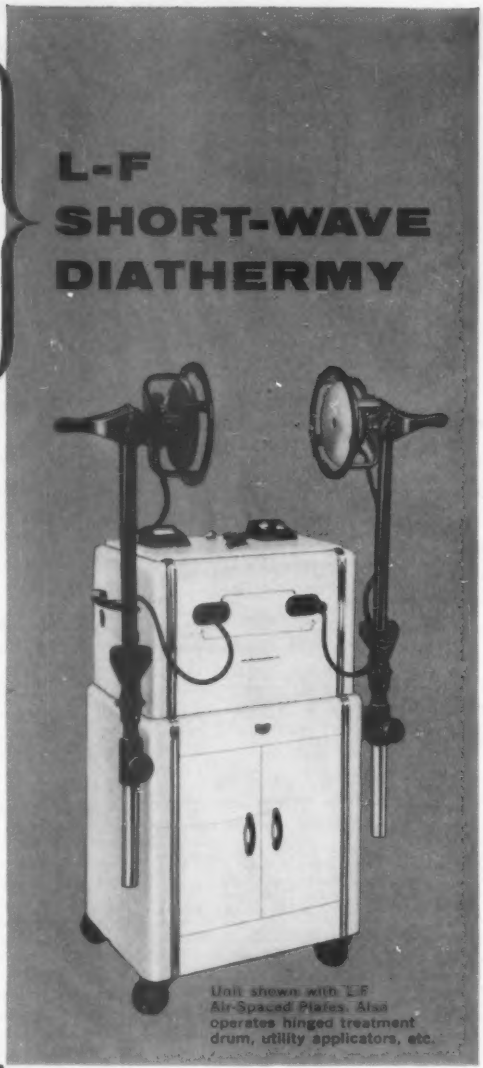
FOR EVERY APPLICATION WHERE THERMAL THERAPY IS INDICATED . . .

This unit is unsurpassed in effective long-path treatments, as well as for localized and diffused treatment applications. Whether the condition of the patient requires mild, moderate or greatest tolerable heat, an L-F Short-Wave Diathermy provides all the flexibility and power necessary.

Exclusive L-F Air-Spaced Plates are positioned effortlessly . . . and they *stay* in the proper position. The L-F Unit also operates a hinged treatment drum or utility applicator.

Consider the L-F Short-Wave Diathermy . . . its safety, convenience and efficiency make it extremely valuable in treating patients with the best in tried and proved therapy.

Send coupon below for complete descriptive literature.



Unit shown with L-F Air-Spaced Plates. Also operates hinged treatment drum, utility applicators, etc.

LIEBEL-FLARSHEIM

Subsidiary of the Ritter Company, Inc.
Rochester 3, New York

Medical-Hospital Division Dept. 6651
Ritter Company, Inc.
Rochester 3, New York

Please send without obligation your latest 6-page brochure describing L-F Short-Wave Diathermy Units.

Name .....

Address .....

City-State .....

"I WEAR A HANGER LEG • • • •

. . . yet ride a bike and ice skate, and have learned to roller skate, skip, and walk down the steps foot-over-foot." Marion Phillips, school girl, began wearing a Hanger Hip Control Prosthesis at the age of 10. The correct fit and dependable performance of her Hanger Prosthesis have enabled Marion to take part in the normal activities of a teenage girl. Her amazing rehabilitation is not unusual, others have been equally successful, and most Hanger wearers are able to return to a normal life.

• • • • • Hanger PROSTHESIS • • • • •

AVAILABLE AT AUTHORIZED FACILITIES IN THE FOLLOWING CITIES:

Eastern Region:

BALTIMORE 1, MD.
BOSTON 15, MASS.
CHARLESTON 2, W. VA.
NEW YORK 11, N. Y.
PHILADELPHIA 7, PA.
RALEIGH, N. C.
RICHMOND 19, VA.
ROANOKE 12, VA.
WASHINGTON 13, D. C.

Midwestern Region:

CHICAGO 5, ILL.
CINCINNATI 29, OHIO
DALLAS 1, TEXAS
EVANSVILLE, IND.
FORT WAYNE, IND.
INDIANAPOLIS 2, IND.
OKLAHOMA CITY 3, OKLA.
PEORIA 4, ILL.
ST. LOUIS 66, MO.
WICHITA, KANS.

Southeastern Region:

ATLANTA 9, GA.
BIRMINGHAM 1, ALA.
COLUMBIA 5, S. C.
JACKSONVILLE, FLA.
KNOXVILLE, TENN.
MIAMI 37, FLA.
MOBILE, ALA.
MONTGOMERY, ALA.
NASHVILLE 5, TENN.
NEW ORLEANS 19, LA.
ORLANDO, FLA.
SAVANNAH, GA.
TAMPA 2, FLA.
WEST PALM BEACH, FLA.

Central Region:

COLUMBUS 8, OHIO
PITTSBURGH 1, PA.

PRESTON

A Complete Line

FOR PHYSICAL MEDICINE AND REHABILITATION

Your one source for all your needs

Write today for your Free copy of

THE ILLUSTRATED PRESTON CATALOG 1058

Describes the leading and most complete line of Equipment for Rehabilitation Exercise, Hydrotherapy and Electrotherapy. Also: Diagnostic Apparatus, Traction Devices, Cerebral-Palsy Furniture, Wheelchairs, Walkers, Lifters, Crutches and Self-Help Devices.

The Catalog is now enlarged by Supplement B — just off the press . . . a compilation of 127 important new and recent additions to the Preston Line. You will find many of these new items of direct value to you. For your free copy simply drop us a note.

THE ALL NEW PRESTON "DENSIFOAM" GYM MAT

The greatest advance in mat construction in many years . . . featuring outstanding shock absorption. Densifoam Mats of 1" thickness are superior in shock absorbence to 4" conventional mats. Other features are:

Light Weight — only 10 ounces per square foot. Densifoam Mats are only 1/3 the weight of standard hair felt mats — makes it easier to handle.

Economy — will last years longer than other mats. Surface is easily cleaned.

Patient's Comfort — Densifoam combines softness and firmness. Available in 2 styles — either Coated (PC 2203); or covered with a Heavy Vinyl Plastic Cover (PC 2200). Both sides of mat may be used on either type. Order by Catalog Numbers:

PC 2200 — Densifoam Gym Mat — 1" thickness with plastic cover and handles .....price per square foot **$2.45**

PC 2203 — Densifoam Gym Mat — 1" thickness, coated, no handles .....price per square foot **$2.45**

FOUR LEGGED CANES

A very popular item for many cases where the conventional cane does not afford sufficient stability.

Four Legged Canes are useful for hemiplegics because they give better support and instill confidence. Also helpful in Multiple-Sclerosis, certain C-P cases, fracture cases, and in Geriatrics. Useful in making the transition from crutches to a conventional cane, or from parallel bars directly to a cane.

The canes will fit any size patient. Come with 4 rubber tips. Also available in a "Cane Glider" model having 2 wheels and 2 rubber tips. Either model may be used singly or in pairs. Please order by Catalog Numbers:

PC 7321 — Four Legged Cane with 4 rubber tips .....**Per Pair $27.00**

PC 7321G Cane Glider with 2 wheels and 2 rubber tips ....**Per Pair $27.00**

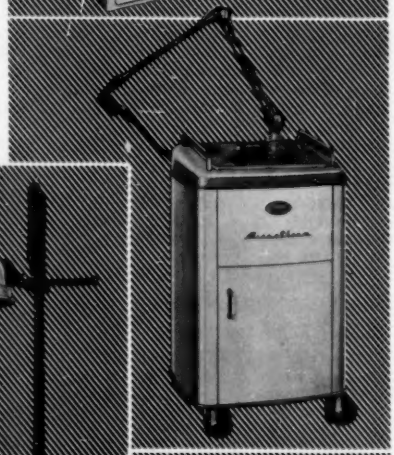
PC 7321 and 7321G can also be purchased singly at $13.50 each

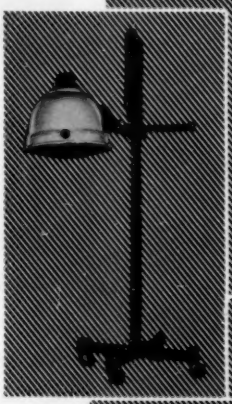
J. A. PRESTON CORP.

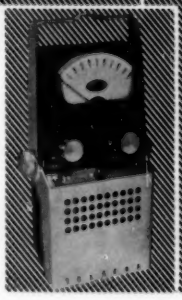
175 Fifth Avenue, New York 10, New York

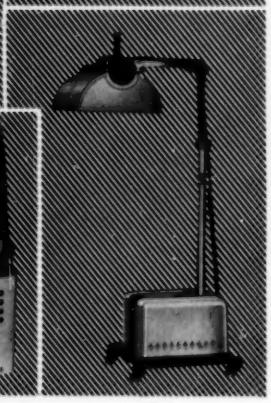
from intensive research...

Burdick®









MODERN EQUIPMENT
for the
MEDICAL PROFESSION

ELECTROCARDIOGRAPHY — After 10 successful years in the manufacture of electrocardiograph equipment, we are proud to present the new dual-speed EK-III. This unit operates at either the standard 25 mm. per second speed or at 50 mm. per second. This higher speed facilitates the study of details of rapid electrocardiographic deflections.

ULTRASOUND — The all-new UT-400 now provides *continuous* ultrasonic energy for conditions where both heating and mechanical effects are desired; or *pulsed* energy where a greater proportion of mechanical effect to thermal is indicated. Here is the ultimate in therapeutic versatility.

DIATHERMY — The Burdick line of diathermy equipment includes the MW-1 Microtherm® for microwave diathermy and the MF-49 unit for conventional short wave diathermy.

INFRARED THERAPY — The Zoalite series of infrared lamps has become a standard of quality and performance for the hospital, physician's office and home use on prescription.

ULTRAVIOLET — Burdick hot quartz mercury arc lamps assure effective treatment with a minimum of exposure time.

CARDIAC MONITOR — The Telecor monitors the heart beat during surgery; either electrically through hypodermic needle electrodes, or mechanically through a digital pulse pickup.

THE BURDICK CORPORATION
MILTON, WISCONSIN
Branch Offices: NEW YORK • CHICAGO • ATLANTA • LOS ANGELES
Dealers in all principal cities

LaBerne Shoulder Rotator

The LaBerne Shoulder Rotator offers Progressive and Resistive Exercises in a complete range, for Internal and External Rotation, Unilateral and Bilateral Extensor, Scapula Rotation, and Elbow Flexor Exercise. Built with Sensitive Resistance-Pressure Plate adjustable in height. Calibrated for 0 to 80 lbs.

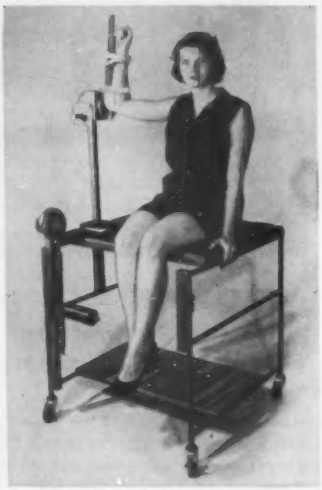
Price including table 28 x 30 x 32

Model # 9952 $159.50

Price without table with bracket for attaching to plinth,

Model # 9952-A $ 89.50

Showing Resistance Control Calibration in pounds. →



LaBerne Extension-Flexion Exercise Unit

Designed for a complete range of Progressive Resistive Exercise to the Knee Joint Muscle Group WITHOUT THE USE OF WEIGHTS.

Exercise arm built with Reversible Ratchet on Sensitive Pressure Plate offering any desired resistance calibrated in lbs. from 0 to 80. Range of motion indicator in full view of patient and therapist for accurately following Range Progress. Ideal for use with BK Amputees and BK Fractures, may also be used for Hamstring Exercise, Hip Abduction and Extension. Complete unit including table 28 x 30 x 32 with Quadriceps Rest, Model # 9950

$159.50

Above unit with Shoulder Rotator included, Model # 9951 $239.00

Showing use for BK amputees and fractures. Range of motion dial calibrated in pounds. →

LaBerne Hip Rotator

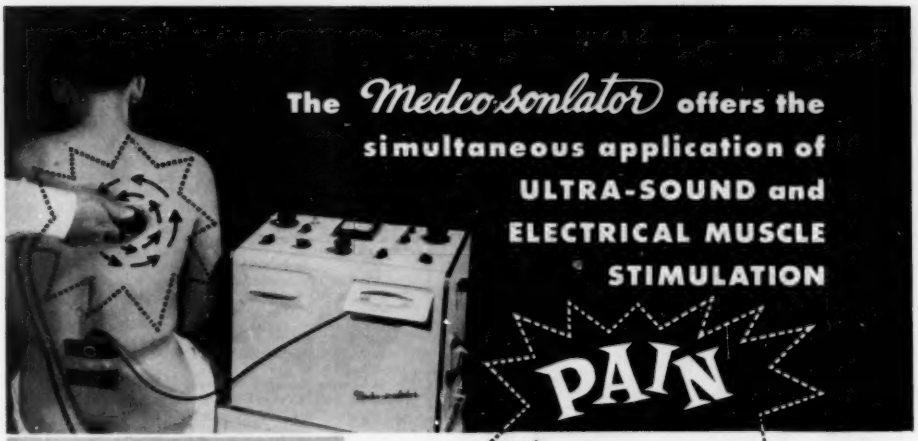
Designed for complete rotation of Hip Joint. Rotation Plate built at 8° angle to eliminate bending of knee during rotation. Mounted on roller bearings with Adjustable Arc from 4" to 12" circle. Model # 66 $49.50

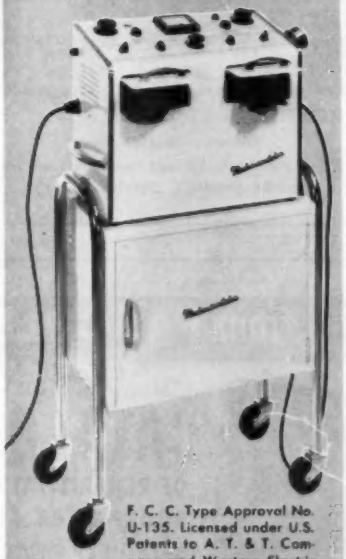
ALL PRICES FOB COLUMBIA

La Berne MANUFACTURING COMPANY

Columbia, S.C. P.O. Box 5245 Phone SUnset 7-6162

ORIGINATORS OF THE "WALK-OFF" PHYSICAL THERAPY TABLE





F. C. C. Type Approval No. U-135. Licensed under U.S. Patents to A. T. & T. Company and Western Electric Company for Therapeutic Generators.
U.S. Patent No. 2,830,578 covering a combination of Ultra-Sound and Electrical Muscle Stimulation through a single "Sound Applicator"

MEDCO WILL BE HAPPY TO PROVIDE REPRINTS OF "MANAGEMENT OF MYOFASCIAL PAIN SYNDROMES IN GENERAL PRACTICE" BY JOHN J. BONICA, M.D.

Myofascial Pain Syndromes . . . A Common Complaint Encountered by Physicians

The high incidence of myofascial syndromes are widely recognized. These include stiffness, limitation of motion, tremors, weakness and manifestations of autonomic nervous system dysfunction. The pain pattern arising from the stimulation of a "trigger point" may be local in distribution, or it may radiate or be referred to a site at some considerable distance from the point of stimulation.

The combination of electrical muscle stimulation and ultra-sound has been found practical as both forms of therapy can be simultaneously blended through the single sound head. This combination is offered only in the Medco-Sonlator which permits the operator to employ the instrument to locate the "trigger area" with electronic palpation and to apply the combination therapy.

MEDCO ELECTRONICS COMPANY, INC.
Division / Medco Products Co., Inc.
3607 E. ADMIRAL PL./P.O. Box 3275/TULSA, OKLA.

☐ Send a copy of Bonica Reprint Department A
☐ I would like office demonstration of the Medco-Sonlator

NAME.....

ADDRESS.....

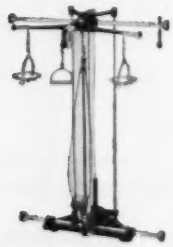
CITY..... STATE.....

Elgin PROGRESSIVE RESISTANCE EXERCISE EQUIPMENT

Elgin Exercise Unit Model No. A-1500

. . . especially designed for the administration of over 100 therapeutic exercises!

It has been proven that exercise therapy must be accurately controlled if the desired end results are to be obtained . . . Elgin, the original designers and manufacturers of Progressive Resistance Equipment, offers the only complete line of exercise equipment designed to meet these requirements. The Elgin line has been developed, in a scientific manner, to give Doctors and Therapists the correct clinical tools with which to properly administer exercise therapy to both surgical and non-surgical patients.
It provides a wide exercise range, from simple functional exercises to the most highly definitive focal exercises. This equipment also provides a means for an effective and efficient out-patient clinic for patients requiring therapy. An Elgin sales consultant would appreciate the opportunity of assisting you in planning for the inclusion of Progressive Resistance Exercise Equipment in your physical therapy department. Write today for complete information.



ELGIN EXERCISE UNIT
Model No. AB-150

ELGIN LEG EXERCISE (Ankle) Model No. LE-125

Write today for information on the complete line of Elgin Exercise Accessory Equipment and Therapy Techniques, request Catalog 200.

Elgin **EXERCISE APPLIANCE CO.**
P. O. BOX 132 • ELGIN, ILLINOIS

Georgia Warm Springs Foundation
GRADUATE COURSE
Physical Therapy and Occupational Therapy In the Care of Neuro-Muscular Disease

This course is open to graduates of approved schools of physical and occupational therapy. Such graduates must be members of the American Physical Therapy Association and/or registrants of the American Registry of Physical Therapists, or members of the American Occupational Therapy Association.

Entrance Dates: First Monday in January, April and October.

Course I — Emphasis on care of convalescent neuromuscular disease with intensive training in functional anatomy, muscle testing, muscle reeducation and use of supportive and assistive apparatus. This course is complete in itself.

Course II — Three months duration with Course I prerequisite. Emphasis on care of severe chronic physical handicaps with intensive training in resumption of functional activity and use of adaptive apparatus.

In-Service Training Program — Fifteen months duration at salary of $225 per month plus full maintenance, increasing to $250 per month at the completion of nine months. This program includes training in Courses I and II.

Tuition: None. Maintenance is $100 per month (except those on In-Service Training Program). For scholarship to cover transportation and maintenance for Courses I and II, contact The National Foundation, 800 Second Avenue, New York 17, New York. (Scholarships require two years of experience.)

For further information contact:
ROBERT L. BENNETT, M.D.
Executive Director
Georgia Warm Springs Foundation
WARM SPRINGS, GEORGIA

FREE! from FASCOLE

NEW
CATALOG OF REHABILITATION EQUIPMENT AND SELF-HELP DEVICES

Write *on your own letterhead* for 80-page catalog with descriptions of over 300 important items for rehabilitation of disabled and convalescent patients. *(Address Dept. AP.)*

Complete line includes latest equipment in:

Ortho-Therapy • Patient Lifts • Exercisers • Walkers Special Canes, Crutches • CP Furniture and Training Aids Dressing, Bathing, Feeding Aids • Incontinent Aids

Now you can order guaranteed merchandise from a *single source* which has built a solid reputation for service. *Discounts* on quantity orders.

Our **"Shopping Center"** catalog of popular self-help devices for patients' use at home is also available FREE upon request...Write to Dept. PM.

FASCOLE CORP. 229 Fourth Avenue, New York 3, N. Y.

Announcing . . .

MEDITRON'S

NEW PORTABLE

MODEL ME-1
10x14x19 inches—35 lbs.

GOLDEN HEART

ELECTROBIOGRAPH

Featuring the all new modular unit GOLDEN HEART high impedance pre-amplifier. Shock mounted, Gold Plated printed circuit with an overall Frequence response of ½ to 15,000 cycles per second.

GUARANTEED ONE YEAR

Service on both coasts and midwest.

A completely new EMG with all the accuracy and dependability of Meditron's full size instruments plus new additional features:

4 Band Pass Selections:

- √ EMG narrow band 10 to 6,000 cps.
- √ EMG wide band 3 to 15,000 cps.
- √ EKG* monitoring .5 to 40 cps.
- √ EEG* monitoring .5 to 40 cps. at 50xgain

*P.7 long persistency CRT screen available

- Differential input push-pull throughout
- High impedance input 2 megohms grid to grid
- Deflection sensitivity 25μv/inch maximum
- Noise: 4μv EMG 1μv EKG and EEG
- 3 Sweep speeds: 1 sec. 10 and 30 milliseconds/in.
- Rejection Ratio 50,000 to one in all positions

Full CONTROL PANEL provides for sweep synchronization and positioning, the sweep is always in view under full control. Sensitivity and Sweep Speed selections: interference rejection control, volume, intensity and focus controls.

Electronically synchronized photographic facilities available.

THE MEDITRON COMPANY

Modern Instruments for Electrodiagnosis and Electrotherapy

MEDITRON

708 So. Fair Oaks Ave., Pasadena, Calif. • RY 1-0101
Eastern Sales Office: P. O. Box 98, Pembroke, Mass.

THE MEDITRON COMPANY
708 S. Fair Oaks Ave., Pasadena, Calif.

Gentlemen:

Please send additional information on:

☐ Electromyography ☐ Meditron Model_____
☐ Reprints & Movie Film ☐ Time Payment Plan

Your Name

Institution

Address

NEW! TOMAC ALL-PURPOSE TABLE

Fully adjustable, folds flat for storage...made of lightweight aluminum, durable Formica top

Ideal utility table, especially suited for wheel chair use. Height and tilt adjustments are quickly and easily made by spring buttons. Tilts 12°. Retractable bookrest. Folds to 4-inch width for convenient storage. Heavy-duty frame and legs made of 1-inch aluminum tubing. Formica top, 18 x 30 inches, in pastel linen finish. Height adjusts from 29 to 33 inches.

No. 5225—Tomac All-Purpose Table....Each **$24.75**
Lots of 6, each **$22.90**

For information on the complete line, please contact our representative, or write...

Other tables, similar to the new Tomac All-Purpose Table, are available. These tables are non-adjustable in height and tilt, and without bookrests. Gray Formica tops.

No. 5226—Folding Utility Table
16"x 23½"x 30" high.....Each **$15.00**
No. 5226A—Folding Wheel Chair Table
18"x 30"x 31" high.....Each **$19.95**
No. 5227—Folding End Table
16"x 19"x 25" high.....Each **$12.50**

Rehabilitation Products
A Division of American Hospital Supply Corporation
2020 Ridge Avenue, Evanston, Illinois

ATLANTA • CHICAGO • COLUMBUS • DALLAS • KANSAS CITY
LOS ANGELES • MINNEAPOLIS • NEW YORK • SAN FRANCISCO • WASHINGTON

NEW for '59

Dallons FUTURA* Line

* ADVANCED ENGINEERING * ADVANCED DESIGN

IN ULTRASONICS . . . . Dallons BUILDS THE BEST

And here's just one proof! **It's the all-new Portable Model 1200**

1959 FEATURES
- 3 COMPLETELY NEW STYLINGS
- 3 CRYSTAL SIZES 7 — 10 — 12.5 sq. cm.
- 3 NEW LOW PRICES. $395. $495. $695.

Approved UL FCC

Model 1200
ACTUAL CRYSTAL SIZE
7 sq. cm.
$395.

Model 1100
ACTUAL CRYSTAL SIZE
10. sq. cm.
$495.

Model 1000
ACTUAL CRYSTAL SIZE
12.5 sq. cm.
$695.

Dallons
all-new 1959 FUTURA LINE

It is truly physical medicine equipment at its unsurpassed best. Never before has there been better engineering, finer appearance, at lower prices . . . We invite your careful inspection and comparison. You will quickly see why doctors everywhere are acclaiming Dallons Futura line *the best!*

WRITE TODAY FOR NEW 1959 FUTURA LINE CATALOG

made only by DALLONS LABORATORIES, INC. 1ST IN ULTRASONICS

5066 SANTA MONICA BLVD., LOS ANGELES 29, CALIFORNIA

HYDROCOLLATOR

Steam PACK

MOIST HEAT

Now moist heat can be applied conveniently, effectively and with a minimum investment in equipment. No dripping, no wringing, no repeated applications. Each application gives at least 30 minutes effective moist heat. The Steam Pack is merely heated in water, wrapped in a towel, and applied. Standard equipment in leading hospitals and clinics across the nation.

DESCRIPTIVE MATERIAL ON REQUEST

CHATTANOOGA PHARMACAL CO., INC.

CHATTANOOGA 5, TENNESSEE

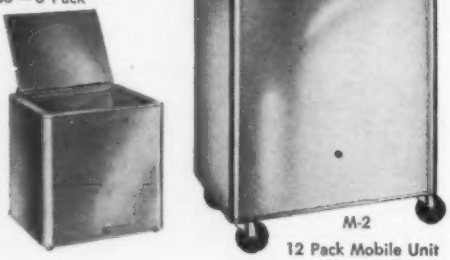
MASTER UNITS

Four all stainless steel models to meet the various requirements in hospitals, clinics, physicians' offices, and patients' homes. Automatically maintains Steam Packs in water at proper temperature — constantly ready for immediate use. No plumbing used.

D-3 2 Pack

E-1
4 Pack

SS — 6 Pack



M-2
12 Pack Mobile Unit

Enjoy a wealth of

INFORMATION

and new ideas . . . all yours

WITHOUT COST!

Write for

CATALOG PM

picturing and describing our new, improved

SURGICAL and ORTHOPEDIC

APPLIANCES

for early training and

REHABILITATION

COSMEVO MFG. CO.

218 Paterson St., Paterson 1, N. J.

TARSO SUPINATOR® SHOES

IDEAL FOR POST POLIO AND CP CHILDREN WHO PRONATE

TARSO SUPINATOR SHOES have been in use for more than 25 years for treatment of weak, plano-valgus feet.

The Tarso Supinator last is specially shaped to swing the hind-foot from valgus into marked varus, thereby lifting the ankle and the longitudinal arch, and inducing adduction of the forefoot. Full orthopedic construction includes medial wedges, medially extended heels and long inside counters.

Pronation is controlled at once. Posture and walk are immediately improved. Tarso Supinators are normal looking, comfortable and trouble-free.

TARSO SHOES are supplied through dealers and directly to institutions. Write for catalog and descriptive literature.

MAURICE J. MARKELL SHOE CO., INC.

332 So. Broadway • Yonkers, N. Y.

Registry Examination Data Feed-Back in Physical Therapy Education

C. d'A. Gerken, Ph.D.
Lincoln, Nebraska

● Subject matter and total Registry examination scores of physical therapists recently graduated from 35 approved schools were compared, school by school. Data indicate graduates from each school have relative strengths and weaknesses; that graduates of no school are below the mean of the total group in all areas; that considerable variability exists among the scores earned by the 1,204 graduates in the subject matter fields; and that relative rankings of schools, determined by the scores achieved by their graduates, show consistency over time. It is suggested that results of the investigation provide unique types of data which may be used to evaluate some outcomes of physical therapy education in the United States.

Introduction

The Registry Examination of the American Registry of Physical Therapists typically is administered to students who have just completed their academic courses at approved physical therapy schools. All these schools have curricula which meet minimum standards set by the Council on Medical Education and Hospitals of the American Medical Association. From these schools graduate almost all of the professionally competent physical therapists who staff our hospitals, clinics, and rehabilitation centers.

A very large percentage of graduates feels it is desirable to attain recognition by national registration. One requirement for registration is passing the Registry Examination, hereafter referred to as REX, designed to sample knowledge in those areas important to the profession. Recent editions of this examination are composed of three hundred items covering the subject matter areas (exclusive of clinical practice) in the course of study. The number of items in each subject matter area is approximately proportional to its emphasis in the approved curriculum. Although the REX is revised from time to time, data in this report are based upon an edition administered during 1956 and 1957 to 1,204 students, all who are graduates of 35 approved schools.

Analysis of REX data provides each school with relatively accurate measures of the professional knowledge of its graduates as a group. Certainly one of the incentives for use of the examination is the assurance that objective, unbiased scores can be made available which may be used as one basis for evaluating educational programs. It is axiomatic that no professional educational program stands still, and since educators typically seek to improve their courses of study, feed-back data of the sort described here may be used as a point of departure for program development if this is felt desirable.

Rationale

Ideally the final criterion of success of any professional educational program is the success of its graduates in the real-life world of professional problems and solutions. From the point of view of the educator, however, it is unfortunate that this kind of success is a function of many variables. Too, although our culture values success highly, its definition is so elusive that there is almost no possibility of relating "degrees-of-success-on-the-job" to "degrees-of-success-in-the-curriculum," however desirable this would be. Since, then, we lack an "ultimate" criterion,[1] an "intermediate" one may be acceptable, especially since it is highly likely that knowledge of a field and competence in the field are positively related. Thus competence always is measured indirectly. This, of course, is the assumption basic to any kind of examination within any occupational field. Furthermore, it is the rationale universally used as a basis for awarding differential grades for differential achievements — for awarding student A a higher grade than student B.

It is only a step, then, to the apparently reasonable assumption that school A is more successful than school B if students of the former earn significantly higher grades on a professional examination

Professor of Psychology, University of Nebraska; Consultant, American Registry of Physical Therapists.

than students of the latter. If this is tenable, perhaps it is possible to take one more step and assume that school A has a better course in physiology, for instance, than school B, whereas B provides better teaching in electrotherapy than school A — all dependent, of course, upon the relative achievements of their graduates in subject matter areas. Minor differences have no significance; consistent and major ones, however, may be meaningful.

The reader should pause here, for a moment, to be reminded that the foregoing are assumptions; the reader may reject any or all of them if he chooses. In addition to these, there are many unstated assumptions which will be obvious to the reader, and which cannot be described here for lack of space. One, however, needs to be examined.

It is mentioned that a very large percentage of graduates takes the REX. Some, then, do not. In some schools, all students are required to pass the REX as a pre-requisite to graduation, it being the feeling of the administration of those schools that it is a good kind of "final exam," and that students who do not pass it have not met graduation requirements. In some other schools, all students complete the REX, although graduation does not depend upon the outcome. In still other schools, however, the REX is only optional. The question then is: "are there biasing factors in the scores earned on the REX by graduates of the last type of school which may operate to misrepresent the achievements of the typical graduates of these schools?" This is very important.

Three possibilities exist. In any school in which the REX is optional, the students who *do* take it are (1) superior, or (2) equal, or (3) inferior to the *average* graduate of the school. If (1) is true, the available scores earned are overestimates of the achievement of the average student; if (3) is true, they are underestimates. If (2) is true, no biasing factor exists.

Practically, although all we can do is speculate, it would seem strange indeed if inferior students from these schools elect to apply for national registry recognition, whereas those who are superior choose not to put themselves to this test. Most educational administrators, wisely providing guidance for their own students, probably would support a different course of action. To return to our assumption — probably the average scores earned on the REX by students from those schools not requiring the examination do not underestimate the average achievements of the graduates from these particular schools.

Variability Among Schools

In table 1 each of 35 schools, ten or more of whose graduates completed the REX between January 1956 and January 1958, is identified by a code number in column A. These code numbers are assigned in decreasing order of the mean scores earned on the total examination, shown in column B. Each school also is represented by the average scores earned by its graduates in each of 12 subject matter areas (columns C through N). Percentage scores are used throughout for simplicity. On the 300 point examination, 210 (70%) is passing, so the 70% mark provides a somewhat universally acceptable, although arbitrary, base point.

In a report of this sort it is obvious that close to half of the graduates' records will be below average. This, of course, is a definition of the word "average," and is inevitable. It is also, from some points of view, discouraging. Perhaps a better base line than "average" would be "passing" — the 70% point. Using this, then, it is noted that the graduates from 33 of the 35 schools earned average scores above the passing point. Physical therapists from the remaining two schools earned average REX scores which are below passing.

Patterns of Achievement

Table 2 shows relative rankings of the schools in each of the several subject matter areas, based upon the achievements of their graduates. This table illustrates the variabilities which characterize the schools — the relative strengths and weaknesses of the students. To a certain extent, of course, this type of

Table 1

Table of Scores Attained on the Registry Examination and on Each Subject Matter Area by Students Graduating from Various Physical Therapy Education Programs

A	B	C	D	E	F	G	H	I	J	K	L	M	N
School (rank)	Total score	Ana-tomy	Kine siol	Path olgy	Phys olgy	Psy-chol	Elect Ther	Radia Ther	Hydro Ther	Mas-sage	Ther Exer	PT Appl'd	Phys ics
1	833	855	907	862	863	883	837	810	748	797	792	797	891
2	810	867	867	844	853	853	745	698	778	739	789	861	730
3	809	821	856	882	805	900	771	777	776	711	814	804	822
4	805	851	887	833	803	777	751	750	707	776	799	793	807
5	803	811	875	863	834	947	769	664	776	765	814	834	766
6	788	803	900	799	803	703	782	690	779	718	780	804	781
7	787	797	882	804	830	833	746	700	770	716	767	827	761
8	786	813	853	833	781	737	745	679	767	745	784	809	780
9	782	856	849	807	808	787	704	652	700	718	791	778	716
10	781	777	844	826	757	697	798	735	712	808	769	785	800
11	780	800	852	800	801	803	731	698	805	753	757	786	779
12	773	774	884	867	785	820	657	647	773	688	811	800	729
13	773	789	854	848	786	797	694	647	749	689	805	789	710
14	772	796	867	759	781	833	697	677	794	780	798	745	743
15	767	810	836	804	775	790	669	660	715	751	779	764	742
16	761	770	844	830	808	827	706	661	735	640	783	784	761
17	761	759	850	802	797	887	669	713	807	673	777	781	634
18	757	728	845	807	807	803	719	668	805	698	770	787	782
19	756	793	847	704	783	863	730	663	778	700	753	784	710
20	751	776	821	772	754	793	617	663	742	725	754	789	659
21	748	757	809	855	775	853	698	550	620	704	770	749	680
22	746	763	826	814	784	913	686	667	661	645	755	787	706
23	745	737	819	805	739	767	689	649	724	671	770	752	773
24	744	765	822	774	757	903	713	577	719	625	778	780	729
25	744	750	864	741	764	843	665	600	700	701	794	733	680
26	743	740	840	766	761	783	701	649	782	699	736	757	671
27	743	716	824	732	735	760	695	666	776	717	774	770	709
28	742	771	806	796	756	770	682	632	647	642	778	742	685
29	740	724	815	847	754	800	662	639	716	681	780	759	651
30	733	744	810	762	717	843	697	693	667	707	727	714	700
31	732	684	807	771	768	890	683	672	709	691	762	758	810
32	730	734	830	735	730	693	625	638	750	716	766	752	662
33	720	739	820	717	729	820	682	667	695	659	707	731	649
34	696	711	783	756	692	690	611	565	744	620	684	717	560
35	689	699	778	741	729	853	586	596	549	643	720	685	600
All	761	774	842	799	777	815	703	666	734	706	771	774	725

Values in this Table are average (mean) percentages of items correctly answered by students graduating from each school. Decimal points are omitted. The bottom row (All) shows the averages for all schools, based upon the mean of the mean percentages of correct answers. These latter values are the best available estimates of "over-all" or average scores.

This Table reads: school number 1 ranked first out of 35 on the basis of total Registry Examination scores earned by the graduates. The average graduate of this school answered correctly 83.3% of all items on the examination, 85.5% of the Anatomy items, 90.7% of the Kinesiology items, 81% of the items on Radiation Therapy, etc.

Table 2

Index Ranks (Highest to Lowest) of Various Physical Therapy Schools for Each Subject Matter Area as Determined by Average Scores Earned by Their Graduates on the Registry Examination.

A	B	C	D	E	F	G	H	I	J	K	L	M
Index Ranks	Anatomy	Kinesiol	Pathology	Physology	Psychol	Elect Ther	Radia Ther	Hydro Ther	Massage	Ther Exer	PT Appl'd	Physics
1	2	1	3	1	5	1	1	17	10	3	2	1
2	9	6	12	2	22	10	3	11	1	5	5	3
3	1	4	5	5	24	6	4	18	14	12	7	31
4	4	12	1	7	3	3	10	14	4	13	8	4
5	3	7	21	9	31	5	17	26	5	4	3	10
6	8	5	13	16	17	4	7	6	11	14	6	18
7	5	2	29	18	1	7	2	2	15	25	12	6
8	15	14	2	3	19	2	11	19	8	1	1	8
9	6	25	4	4	2	8	30	3	2	9	4	11
10	11	3	8	6	21	11	6	5	20	2	13	23
11	7	13	16	11	35	19	8	27	6	8	20	5
12	14	8	10	17	25	18	14	12	9	16	18	7
13	19	11	22	13	30	24	31	7	27	6	22	16
14	13	17	9	12	7	16	18	8	7	29	11	14
15	10	9	18	22	14	9	22	32	32	15	10	15
16	20	19	23	19	16	26	33	13	3	24	16	2
17	12	18	7	8	12	21	27	1	30	28	19	12
18	28	10	15	14	33	14	5	34	21	17	17	24
19	16	16	17	15	11	30	19	20	25	27	24	9
20	24	26	11	21	18	27	20	16	19	14	9	13
21	22	15	6	31	29	13	16	23	26	21	27	19
22	17	32	28	25	13	23	15	24	18	23	15	27
23	21	22	24	26	20	22	9	29	31	10	29	22
24	25	27	20	10	15	31	23	15	13	7	31	30
25	30	24	31	24	9	28	26	10	12	32	26	28
26	26	20	26	28	26	33	12	31	29	31	23	21
27	33	33	30	20	4	15	13	4	17	11	32	25
28	23	23	14	29	28	17	29	9	23	22	21	26
29	32	29	34	23	23	25	32	25	33	20	14	32
30	18	30	25	27	27	29	28	33	22	19	28	20
31	29	21	35	32	8	12	25	30	35	26	25	29
32	27	31	32	33	6	32	35	22	28	30	33	33
33	34	28	27	35	10	20	24	28	16	35	34	17
34	35	34	33	30	32	34	34	21	24	33	30	35
35	31	35	19	34	34	35	21	35	34	34	35	34

Column A is the index column, showing ranks from high to low. The numbers in columns B through M represent the code numbers assigned to the schools; these are the same numbers as in Table 1, column A. The Table reads as follows: on the Anatomy section, school number 2 ranked first, school number 9 ranked second, school number 1 ranked third, school number 15 ranked eighth, etc. Tied ranks are not shown on this Table but, of course, are adjacent.

Schools whose graduates earned average scores or above are listed above the single horizontal lines. Those with scores at or above the passing (70%) marks are shown above the double horizontal lines.

table magnifies differences, but it is useful as one basis for improving course offerings if curriculum changes are felt to be appropriate.

Each school has its own pattern of relative achievement of its graduates. The most meaningful way to use table 2 is to make a "profile" for a particular school by connecting its code numbers in each of the twelve columns with a line. The profile for a school graphically shows relative strengths and weaknesses of its students. If a "profile" were drawn on table 2 for school number 18, for instance, it would show clearly that this school ranked

30th in Anatomy
17th in Kinesiology
15th in Pathology
7th in Physiology
20th in Psychology
12th in Electrotherapy
14th in Radiation Therapy
3rd in Hydrotherapy
22nd in Massage
20th in Therapeutic Exercise
12th in Applied Physical Therapy
6th in Physics

Perhaps the faculty of school number 18 might decide initially to strengthen course work in anatomy considerably, and improve teaching somewhat in psychology, massage, and therapeutic exercise. The faculty may take pride, however, in the graduates' achievements in physiology, hydrotherapy, and physics.

Variability Among Subject Matter Areas

Up to this point, variabilities among schools have been described. The following section compares attainments of physical therapy graduates as a whole in the subject matter areas. The same basic data are used, but they are viewed and processed differently. REX scores are used as a means for evaluating the extent to which uniformity or variability characterizes the achievements of physical therapy graduates as a group, and to make tentative judgments about the graduates' levels of knowledge in the subject matter areas. It is assumed, in the absence of other standardized data, that results for the REX provide the best means available for making comparisons.

It will be remembered that each of the 35 schools is represented for *each* subject matter area of the REX by one score — the average (mean) score its graduates earned in *that particular field.* When the 35 scores for any field are arranged in order, the median or middle score can be found. In addition, the total range of 35 scores can be divided into four equal parts — each containing 25% of the schools. These data appear in chart 1.

It is noted immediately that kinesiology is the subject about which the graduates have the greatest knowledge, since its median is highest. Psychology and pathology follow closely. The median for radiation therapy is lowest; medians for massage and electrotherapy are quite low, too. Small differences probably are unimportant ones, but certainly there are real differences between those subjects near the top and those near the bottom of the hierarchy.

It may be protested, on two counts, that bases used for comparison are open to question. First, some subject matter areas inherently are more difficult to learn than others and, second, examination questions in one area may be more difficult than those in others.

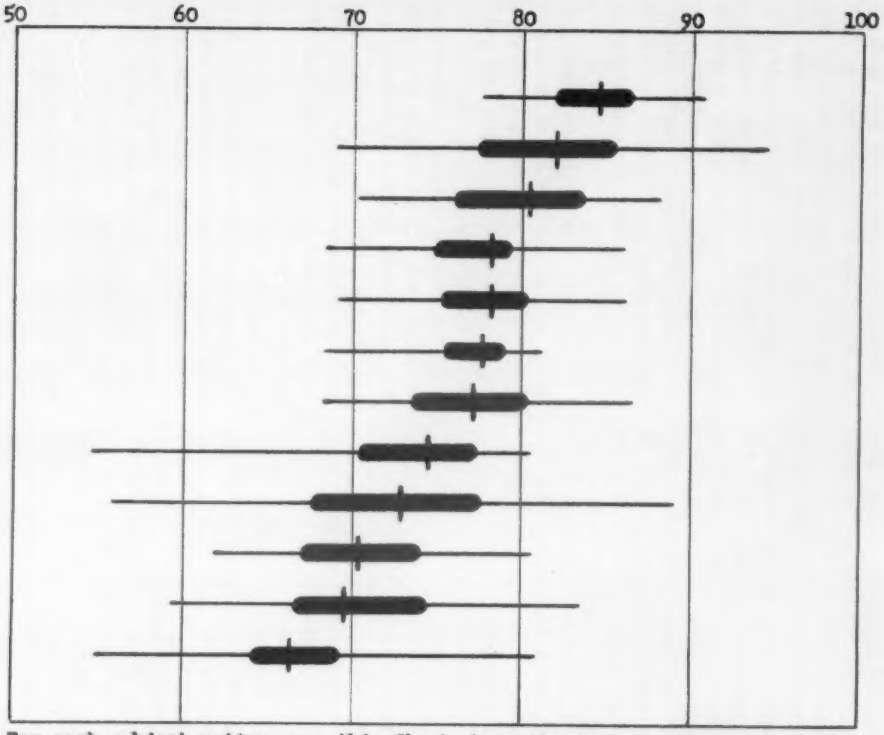
Practically, it is almost impossible to control these variables with precision. As for the first criticism, it would be very difficult to design a research project which could provide empirical data about the problem. It is also highly likely that few people in the field could agree independently about relative difficulties of the subject matter areas. With reference to the second criticism, it is impossible to conceive of item difficulty apart from the data used here; item difficulty actually is defined by percentages of examinees who pass or fail certain items, and this is one aspect of the topic under consideration. It is worth noting that data available for most of the items (based upon their prior use) do not provide any clues indicating that items in some subject matter areas are more difficult than those used in the others.

Since physical therapy education is professional in nature, and each school

Chart 1

A Comparison of Average Scores Earned on the Various Subject Matter Areas of the Registry Examination by Graduates from 35 Physical Therapy Schools

Subject Matter Field	Median	I-Q-R
Kinesiology	84.4	4.5
Psychology	82.0	8.1
Pathology	80.4	7.5
Applied Physical Therapy	78.1	4.3
Physiology	78.1	4.9
Therapeutic Exercise	77.7	3.4
Anatomy	77.1	6.7
Hydrotherapy	74.4	7.1
Physics	72.9	10.1
Massage	70.4	6.9
Electrotherapy	69.7	7.6
Radiation Therapy	66.4	4.9



For each subject matter area this Chart shows the lowest average score, the lowest 25%, the middle 50%, the highest 25%, and the highest average score. The vertical line shows the median score. The legend below illustrates.

Lowest 25% of the average scores

Middle 50% of the average scores (Inter-quartile range)

Highest 25% of the average scores

is presumed to provide somewhat comparable education, probably some sort of uniform knowledge is assumed to be desirable. The range of scores for the middle 50% of graduates for each subject matter area — the interquartile range — is a useful index. The smaller this value, the greater the uniformity. Variabilities tend to be largest for physics and psychology, and least for therapeutic exercise and applied physical therapy.

One additional item of interest is clearly illustrated on chart 1. In only two of the standard subject matter areas are the averages for all schools above the 70% passing point. These two are pathology and kinesiology. Since the passing score for the total examination is 70%, perhaps as an ideal it is desirable for graduates of all schools to receive grades of 70% or above in all areas.

From both theoretical and practical viewpoints, it is inevitable and desirable that differences should exist among schools of physical therapy as among all other kinds of free institutions. Professional educators in the field should seek to support such differences once their sources have been defined and understood. When variabilities among schools are a function of carefully planned programs designed to attain appropriate goals, rather than accidental by-product phenomena, their value to physical therapy education is a maximum.

Trends

So far this report has been based upon data from the immediate past. Looking at these data from the vantage point of a longer time perspective can provide a glimpse of trends which may be of real significance.

In 1946, an earlier study[2] was reported, based upon the total scores earned on a prior edition of the REX by physical therapists graduated in 1943, 1944, and 1945. Scores from 16 of these schools may be compared with scores from the same schools for the years 1956-1958. With the exception of two schools, both of which were in the process of development in the earlier years, and both of which have improved their relative positions markedly during the last dozen years or so, there is remarkable consistency over this period of time. The rank difference correlation of average scores earned by the graduates, if the two schools are eliminated from calculations, is .68. If the two schools are included, the correlation is .33.

Another study completed in 1956 (unpublished but distributed to all approved schools) compared scores earned by graduates of 33 physical therapy schools on the edition of the REX used during 1952-1955. When these 33 schools are ranked on the basis of average scores earned by their graduates, and when the ranks are compared with those assigned to the same schools in the present study, the rank difference correlation is .77, even though different forms of the REX are used as bases for the data.

Some schools, then, rather consistently graduate physical therapists whose measured knowledge of the field is high; other schools tend to graduate physical therapists whose knowledge, similarly evaluated, is relatively lower. Although it is clear, of course, that the raw data themselves yield no clues which define cause-and-effect relationships, the persistence of the phenomena over periods of time is an interesting subject for speculation.

Discussion

The Registry Board of the American Registry of Physical Therapists believes that information of the sort described in this report may be helpful as one basis for understanding and improving professional education in the field. Complete and detailed data have been sent to the administrative offices of each school, together with its own code number. All information is treated confidentially; only the writer has access to the code. Each school is free therefore to make any decisions which seem appropriate, since no extramural pressures can be exerted by any organization or individual.

Undoubtedly, there are many aspects of physical therapy education which cannot be evaluated by using the sorts of data described here. As already stated, these are only intermediate criteria. It is therefore obvious that any judgments

made about teaching or curricula based upon these materials are purely inferential, based upon secondary sources — the attainments of graduates.

It is interesting, parenthetically, to theorize about whether there *are* any primary sources of information which may be used to evaluate education in physical therapy or, for that matter, any other professional field. Possibly data of the sort described here are currently the only readily available criteria which are at once quantitative, quite reliable, standardized, and relatively free from contamination or bias.

In this type of investigation, as in many kinds of research, the investigator is limited by practical considerations: fewer cases than would be desirable, the impossibility of setting up and maintaining rigid controls, less-than-perfect instruments, fortuitous circumstances which limit the accuracy with which hypotheses can be stated and tested, and the very uniqueness of this sort of venture (to the best of the writer's knowledge, there is no precedent for this sort of evaluation of education in any professional field). All of these factors undoubtedly exert some effects upon the precision and usefulness of the project.

More sensitive measuring instruments (for instance an examination composed of 3,000 items instead of only 300), or more precise determination of standards used to allocate examination items to particular subject matter areas, or serious attempts to develop criteria which reflect "degrees-of-success-on-the-job," and the like doubtless would yield finer discriminations and warrant the use of more sophisticated statistical technics than are used here.

Perhaps if adequate support becomes available for research and development in the evaluation of physical therapy education, additional questions can be answered. In any event, it is hoped that this report may increase interest in and understanding of some intriguing problems.

References

1. Thorndike, R. L.: Personnel Selection, New York, John Wiley & Sons, Inc., 1949, pp. 121-124.
2. Gerken, C. d'A.: The Registry Examination. Arch. Phys. Med. **27**:508 (Aug.) 1946.

Attention ACPM&R Members —

Suggestions for nomination for fifth vice-president of the American Congress of Physical Medicine and Rehabilitation are now being received by the Nominating Committee. Members in good standing of the ACPM&R may submit their suggestions to the committee. However, when submitting the name of a candidate, a list of the candidate's qualifications for this office should be included. All correspondence pertaining to this announcement should be sent direct to

DONALD L. ROSE, M.D., *Chairman*
Nominating Committee, ACPM&R
Department of Physical Medicine
University of Kansas Medical Center
Rainbow Boulevard at 39th Street
Kansas City 12, Kansas

Electromyographic Composition of Poliomyelitis-Injured Muscle

Ernest F. Adams, M.D.
Peoria, Ill.
and
G. Clinton Knowlton, Ph.D.
Warm Springs, Ga.

● This paper reports the results of an electromyographic survey of 120 poliomyelitis injured muscles. The subject muscles were evenly distributed through the Lovett grades from zero to G or better. The incidence of fibrillation, voluntary polyphasic units, normal contour motor units and silence has been tabulated on the basis of a sixty point examination of each muscle. The incidence pattern of these electromyographic features in relation to muscle grade is described and the significance of these findings to diagnosis, prognosis and treatment is discussed.

The observations reported herein are the result of an electromyographic survey of 132 muscles in patients who had had poliomyelitis from 3 months to 15 years before the observations. The purpose of this survey was to examine the relation between the electromyographic findings and the manual muscle strength tests of these muscles.

Observations were limited to the following muscles: rectus femoris, anterior tibial, long peroneal, and gastrocnemius. The muscle strength grade was determined prior to the electromyographic examination.

Method

The electromyographic survey was made with a coaxial needle electrode. Sixty points of needle placement were observed in each muscle, these points being distributed equally between the proximal, middle, and distal parts of the muscle. The electrical activity detected by the needle electrode was, after adequate amplification made audible through a loud-speaker and visualized on the screen of a cathode-ray tube in order to determine, for each point, the presence or absence of normal motor unit potentials, voluntary polyphasic potentials, or fibrillation potentials. If none of these three phenomena were present the point was scored as "silent."

In the survey of a muscle the needle was simply thrust into the given area, an appraisal made at that point, and the needle moved to another point, and so on, without any effort being made to "find" any of the particular potentials. Furthermore, no point was given a double voluntary motor unit score. If a polyphasic potential was produced at a point during voluntary effort it was scored and normal motor units which might be present at the same point were not scored. Thus the maximum number of voluntary motor units from any muscle area was 20.

Results

Table 1 gives the average incidence of each characteristic in the areas studied. The maximum possible incidence of any characteristic in any area was 20. Along with the average values the standard error for each average is given as well as the significance of the differences of the succeeding averages in each column. The significance is expressed as the *P* value for the difference. For the purposes of these calculations Lovett grade groups were combined to give six strength groups as shown in the table.

Voluntary Motor Units. In proceeding from the stronger to the weaker muscles there was a gradual decrease in the incidence of voluntary motor units. There was no significant difference in the incidence between muscles graded from N— to F+. In the next three steps of muscle strength the differences have moderate significance, while in the step from Trace to Zero grade muscles the difference in the incidence of voluntary motor units is highly significant. Obviously the incidence of motor units does not furnish any criteria as to the

Read at the Thirty-sixth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, August 27, 1958.

Institute of Physical Medicine and Rehabilitation; formerly, Department of Physical Medicine and Rehabilitation, Georgia Warm Springs Foundation, Warm Springs, Ga., and Department of Physical Medicine, Emory University, Emory, Ga.
Director, Research Laboratory, Georgia Warm Springs Foundation, Warm Springs, Ga.

Table 1: Electromyographic Survey of Postpoliomyelitis Muscle

Grade	No. of Areas	Voluntary Motor Units			Voluntary Polyphasics			Fibrillation			Silence		
		Mean	S.E.	P	Mean	S.E.	P	Mean	S.E.	P	Mean	S.E.	P
N— to G	45	19.7	0.17	——	5.4	0.68	——	1.3	0.36	——	0.2	0.12	——
G— to F+	36	19.9	0.08	0.23	3.2	0.75	0.01	4.2	0.85	0.001	0.0	0.00	0.05
F to P+	74	17.3	0.68	0.03	4.4	0.74	0.13	5.1	0.67	0.20	1.9	0.56	0.001
P to P—	73	15.6	0.80	0.06	3.5	0.69	0.18	8.1	0.72	0.001	2.2	0.51	0.35
Tr	61	14.0	1.03	0.11	1.4	0.33	0.003	5.7	0.71	0.008	3.3	0.67	0.10
0	92	7.9	0.96	0.001	0.3	0.16	0.001	4.1	0.54	0.04	9.0	0.84	0.001

exact muscle strength. All muscle areas in muscles of the functional grades yield very near the maximum number of voluntary units. Muscles from F to Trace inclusive show voluntary motor units in over half of the points examined per area. Even in the Zero grade muscles voluntary motor units are detected at over one third of the points examined. These results emphasize that the presence of a voluntary motor unit action potential denotes nothing about the contractile strength of that motor unit. In making an electromyographic appraisal it is important to keep in mind that the motor unit potential is an indicator of the excitatory events of the unit and not of the contractile events. With no voluntary motor unit potentials one can expect no voluntary strength, but a muscle may have many voluntary motor units which yield little or no strength.

Polyphasic Motor Units. A certain number of the voluntary motor units discussed were polyphasic. The criteria for these were that they be under reliable voluntary control with a reproducible contour. If any potentials, suspected of being polyphasic, could not be brought into action by voluntary effort in repeated trials and each time show the same potential contour, they were regarded as interference potential artifacts and such points were scored as normal motor units.

A true polyphasic motor unit means that the excitation to the several fibers of the unit is not synchronous. The time lapse between the excitation events of the various parts of the unit is usually accounted for on the basis of a difference in the time of arrival of the motor impulse. Delay can occur as the result of uneven maturation of the motor nerve twig terminals or may be the result of spotty demyelinization of the terminal twigs. Thus polyphasic units may be the sign of adoption of previously denervated muscle fibers or the sign of a degenerative process. In postpoliomyelitis muscles the polyphasics can be taken to be a sign of adoption of previously denervated muscle fibers by spared motor nerves. Thus it might be expected that the more polyphasic units there are, in relation to the initial injury, the better will be the muscle. This expectation is borne out by the incidence of polyphasic units shown in table 1. The highest absolute incidence was found in muscles of grade N— to G. There is little difference in the incidence of such units in muscles from grade G— through P—, but then there is a moderately significant decrease in the Trace muscles and a highly significant decrease in Zero muscles.

Fibrillation. Fibrillation potentials, as found in postpoliomyelitis muscles, can be taken as indication of the denervated but still viable muscle fibers present. The incidence of fibrillation found in the muscles of various grades is shown in table 1. This shows a gradual increase from muscles of grade N— to G through the P to P— group. Then the incidence decreases in grades Trace and Zero. The decreased incidence of fibrillation in Trace and Zero muscles is related to the increased points of silence in these muscles.

Silence. Points of silence in postpoliomyelitis muscle, three months or more after the acute onset of the disease, may be taken to represent that fraction of the denervated muscle fibers that has undergone degeneration. The average incidence of silence in these muscle areas

Table 2: Pathologic Electromyographic Points in Postpoliomyelitis Muscle

	Initial Injury			Polyphasic Index			Silent Index		
	Mean	S.E.	*p*	Mean	S.E.	*p*	Mean	S.E.	*p*
N— to G	6.0	0.69	— —	0.66	0.065	— —	0.02	0.012	— —
G— to F+	5.9	1.01	0.53	0.33	0.064	0.001	0.00	0.000	0.04
F to P+	9.4	0.85	0.004	0.31	0.046	0.21	0.12	0.031	0.001
P to P—	12.1	0.81	0.011	0.24	0.042	0.001	0.16	0.032	0.18
Tr	9.7	0.97	0.03	0.16	0.039	0.001	0.21	0.040	0.16
0	13.3	0.87	0.003	0.03	0.014	0.001	0.49	0.044	0.001

is shown in table 1. Occurrence of silent points in muscles of functional grade is rare. There is a progressive but hardly significant increase in silent areas in the grades from F to Trace with a highly significant increase of silent areas in Zero muscles as compared to Trace muscles.

Significance of Results

It appears that after the initial denervation following poliomyelitis three possibilities exist for the denervated fibers: (1) they may be adopted by remaining intact nerve fibers and so be returned to the population of useful muscle units under voluntary control; (2) they may remain denervated but viable when they will be evidenced by fibrillation potentials; (3) eventually denervated muscle fibers will degenerate leaving a silent point in the muscle. Thus the initial denervation injury to the postpoliomyelitis muscle can be judged from the electromyographic observations by taking the sum of the incidence of polyphasic units, fibrillation, and points of silence.

In the results as summarized in table 1 the sum of polyphasics, fibrillation, and silence in a given muscle might add up to more than 20 since a polyphasic unit and fibrillation potential might be scored to the same point.

For purposes of the summations and subsequent calculations as given in table 2 it was felt desirable to have the maximum amount of injury per area equal to the number of points observed per area; that is 20. Therefore when a polyphasic unit and a fibrillation occurred at the same point only the polyphasic is scored in table 2. The section of this table titled "Initial Injury" gives the average values so obtained for the various strength groups along with the standard error of each average and the *P* value for the successive values of the column.

If we set our level of significance as $P = 0.01$, then it can be seen that the muscles examined fall into two broad categories; those of functional strength (F+ and better) have, on the average, an equal amount of initial injury as this term is here defined. Muscles below functional strength show significantly more initial injury than is shown by the functional group.

Initial Injury. The initial injury difference between the G— to F+ group and the F to P+ group is highly significant, the weaker muscles showing the more electromyographic evidence of initial injury.

The injury of the F to P+ group just fails of being significantly less than that for the P to P— group. As between the F to P+ and the Trace group there is no real difference, but between the F to P+ group and the Zero group there is a highly significant difference, with the Zero group showing the more injury. So far as this index of initial injury is concerned, the nonfunctional muscles fall into two groups; F to P+ and Trace muscles making up one group, and P to P— and Zero muscles making up the second group having significantly greater injury than the first group.

Thus on the average the initial injury to muscles from N— through F+ is sufficient to give 6 pathologic findings out of 20 points examined; muscles F through P+ and Trace give about 9.5 such points; and muscles of F to P— and Zero give from 12 to 13 of such points. Thus there are two strength

groups for each of the three initial injury groups. The mild injury of 6 points out of 20 being represented by the N— to G and the G— to F+; the moderate injury groups being F to P+ for the stronger and Trace for the weaker; and the severe injury giving the P to P— for the stronger and Zero as the weaker muscle group.

Polyphasic Index. The second column of table 2, labeled "Polyphasic Index," is the ratio of polyphasic potentials to the total pathologic potentials summed in the first column. These polyphasic points are assumed to have been derived from the original denervated muscle fibers and so represent the extent of spontaneous recovery that has occurred. The factors relating to the adoption of denervated muscle fibers in partially denervated muscle have been reviewed by Edds.[1] It appears that the extent to which adoption occurs is determined early after the partial denervation. But whether such adopted units persist and develop into useful voluntary muscle or will retrogress will depend, in part at least, upon the convalescent care the muscle receives. There is certainly some clinical experience to indicate that injudicious activity during the period of maturation of these adopted units can result in irreversible injury to them so that they retrogress to silence.

The data of column 2 in table 2 (Polyphasic Index) are in agreement with the above appraisal of the significance of the polyphasic units of postpoliomyelitis muscle. Considering the mild or 6-point injury group, the stronger muscles (N— to G) show 66 per cent of the pathologic points to be polyphasic units while in the weaker muscles (G— to F+) only 33 per cent of the pathologic points are polyphasic. In the moderate (9.5-point injury group) the stronger muscle (F to P+) shows 31 per cent of the pathologic points as polyphasic as compared to the weaker (Trace) muscles of this group which show only 16 per cent polyphasics in the pathologic fibers. The same comparison holds for the severe injury (12 to 13 points) muscle. Here the respective polyphasic percentage of the pathologic points is 24 per cent for the stronger (P to P—) and only 3 per cent for the weaker (Zero) muscles.

A denervated muscle fiber, if not adopted, can continue to show fibrillation for many years. While it will eventually degenerate, this process can be delayed for a very long time by adequate muscle care. Thus the appearance of silent points (after the first three months of partial denervation) may be taken as evidence of degeneration and if relatively early in time (three months to several years) can be considered as evidence of inadequate or inappropriate muscle care.

Silent Index. Column 3 of table 2 (Silent Index) gives the average ratio of silent areas to the total pathologic points in the muscle areas studied. In the muscles having a functional grade, electrical signs of degeneration (Silence) are seldom found and the index does not differ significantly from Zero. But in the nonfunctional grades there is a significant amount of silence. Here again there are significant differences between the stronger and weaker muscles of the moderate injury and severe injury groups. Thus the silent index for the F to P+ muscle is 0.12, as compared to 0.21 for Trace muscles; and for P to P— muscles, 0.16 as compared to 0.49 in Zero muscles.

It can be concluded from these results that the quality and quantity of the electromyographically observed pathologic points in postpoliomyelitis muscle do have a relationship to the muscle strength. The higher the number of polyphasics and the lower the incidence of silence, in relation to the total number of electrically determined pathologic points, the better will be the muscle strength.

Discussion

While the average data, discussed above, describe the central tendency of the electromyographic findings, much of the usefulness of the electromyographic data is lost in the compilation of such averages. Actually, the most useful muscle appraisal to be made from electromyographic data is a consideration of the electrical activity of each muscle in relation to its strength. As a rule, as shown

by the average data, this relationship is unequivocal. But it is in the individual observation, where the electromyogram indicates a better muscle than does the muscle strength, that the electromyogram becomes of most importance.

As an instance, consider a muscle included in the above averages having a grade of Zero. This gastrocnemius showed 20 points of voluntary motor units in each of the proximal, middle, and distal areas of the muscle. There were no polyphasic potentials, no fibrillation, and no silence. As discussed above this certainly does not mean that the muscle is stronger than the manual muscle test shows, although it might suggest another manual muscle test. It might also suggest a re-examination of the diagnosis. In this instance all the surrounding evidence, except the electromyograph, indicates anterior poliomyelitis. So the manual strength test and diagnosis seem valid in spite of no electromyographic evidence of peripheral nerve injury. This does not indict the electromyographic finding as useless. It has demonstrated the presence of abundant motor units under voluntary control. Positive value in this finding is the indication of a definite possibility for improvement of muscle strength through appropriate training. Actually this muscle finally reached a functional level.

In contrast consider a Zero grade gastrocnemius, examined electromyographically 9 months after the acute onset. Examination of this muscle showed only silence in all points in all areas. The absence of any fibrillation again suggests a re-examination of the diagnosis, which cannot be challenged successfully because all the surrounding history at onset including a positive spinal fluid, indicates anterior poliomyelitis. Electromyographic findings certainly agree with the manual muscle test. Chronaxie measurement is indicated (because of silence and no fibrillation) and found to be over 30 milliseconds, verifying a denervated but no longer fibrillating muscle. The prognosis can here be made that there is little possibility for any return in this muscle. A year's treatment regime, ignoring the electromyograph prognosis, has substantiated its accuracy.

An example of a nonequivocal electromyographic finding is a Zero grade gastrocnemius showing 20 points of fibrillation in each area. No voluntary motor units were found. Here the manual muscle strength test, the diagnosis, and the electromyogram all agree. The electromyographic prognosis is for no recovery and this has been substantiated by complete lack of improvement.

There are not only marked electromyographic variations in different muscles of the same grade affected by poliomyelitis, there are also considerable electromyographic differences between the several areas within a given muscle. The extent of agreement between areas of a given muscle can be measured numerically by the coefficient of correlation between some electromyographic characteristic of the two areas under comparison. For this purpose we have chosen the total incidence of pathologic points.

The correlation between the proximal and middle areas in 132 muscles is 0.7507. This shows that, while a high incidence of pathologic points in one area of a muscle is in general associated with a similar incidence in another area, there is not a very exact agreement between the two areas in a given muscle. Thus in a specific muscle the electromyographic observation can point to a specific portion of a muscle as being chiefly involved with the other portion relatively uninvolved. This sort of finding can also be of importance in prognosis. For instance, a muscle of Zero grade showed 16 voluntary units and 4 points of silence in the proximal area, 7 voluntary units and 13 points of silence in the middle area, and 20 voluntary units in the distal area. Obviously this muscle has two areas, both with abundant motor units, separated by a badly involved area. It can be predicted that when the middle area becomes sufficiently fibrotic to transfer the contractile power of the two ends, this muscle will show more strength than at the moment.

Summary and Conclusions

It can be concluded that on the average there is a good agreement between

the electromyographic incidence of voluntary motor units, voluntary polyphasic potentials, fibrillation potentials, and silent points, and the manual muscle strength test of postpoliomyelitis muscles.

It is postulated that an appraisal of the initial injury can be had from the sum of the incidence of electrically pathologic points (voluntary polyphasic potentials, fibrillation and silence).

It is suggested that the intensity of spontaneous recovery can be appraised from the ratio of polyphasic potentials to the total pathologic points. This has been called the "polyphasic index" and is found to correlate well with the manual muscle grade.

Considerable variation occurs in the incidence of the various electromyographic features studied in muscles of the same grade. The interpretation of the individual muscle data has been illustrated.

Reference

1. Edds, M. V., Jr.: Collateral Nerve Regeneration. Quart. Rev. Biol. 28:260 (Sept.) 1953.

SUCCESS IS THE KEYNOTE

of our Minneapolis — 1959 meeting! An interesting scientific exhibit will contribute much to our success. In addition to the tremendous value of these exhibits, YOU have the opportunity to be considered for one of the coveted awards. Requests for applications for scientific exhibit space in connection with the 37th annual session scheduled for August 30-September 4, 1959, Hotel Leamington, Minneapolis, are now being received. Address all communications to the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, Illinois.

EASTERN SECTION MEETS

The Eastern Section of the American Congress of Physical Medicine and Rehabilitation will meet at Yale Medical School, New Haven, Conn., April 18, 1959. Details covering this meeting may be secured from Isadore Levin, M.D., Chairman, 1801 Eye St., N.W., Washington, D. C.

Use of Hydrocollator Packs in the Treatment of Neck and Shoulder Pains

Yvonnie M. Cordray, M.D.
and
Edward M. Krusen, Jr., M.D.
Dallas

● This report is based on a study of more than 100 patients with symptoms of pain in the neck and shoulder and headache, classified as "cervical syndrome." The purpose of this study was to evaluate the use of Hydrocollator packs as opposed to short wave diathermy for therapeutic results. All patients selected were treated by the Hydrocollator pack as the only form of heat. This was usually followed by deep sedative massage and an active neck exercise program. There were several patients in this group who were treated with Hydrocollator packs because short wave diathermy was contraindicated. Patients were divided according to sex and classified on the basis of etiology. Results of treatment were determined for each group. The results obtained by the use of the Hydrocollator in relieving symptoms compared favorably with those previously obtained for a similar group of patients treated by short wave diathermy.

This study was done in an effort to evaluate the usefulness of hydrocollator packs as a method of applying therapeutic heat. A study of 800 patients with "cervical syndrome" who were treated with short-wave diathermy, deep sedative and frictional massage, active neck exercises, and sometimes traction was previously reported.[1] The present report is based on the study of 100 similar patients with symptoms of pain in the neck and shoulders, and headaches classified as "cervical syndrome." All patients in this group were treated by the hydrocollator packs in place of the short-wave diathermy. Symptoms and findings common to patients with cervical syndrome have been discussed in detail in the previous report and are therefore not repeated here.

Analysis of Cases

All patients were divided into two main categories: the injury group and the noninjury group. The 48 patients who had injuries were broken down into 4 groups according to the type of injury sustained; the noninjury group, consisting of 52 patients, was further divided into 5 groups according to etiology (see table 1).

Therapeutic results obtained for patients who had acute cervical fibrositis or myositis will be considered separately since the previous study showed the treatment time and prognosis for this group to be quite different from the others. The largest group in the noninjury series consisted of the 33 patients with "tension neck." These patients had cervical symptoms associated with environmental factors producing tension.

Except for the smaller total number of patients, the breakdown of cases in this study is quite similar to that of the previous series.

Table 1: Analysis of Cases of "Cervical Syndrome"

	No. Cases
Injury Group	
Auto accidents (usually whiplash type injuries)	37
Direct injuries to head and neck	7
Falls	2
Indirect injuries	2
	48
Noninjury Group	
Acute fibrositis	7
Advanced osteoarthritis	2
Scalenus syndrome	4
Cervical disc	6
"Tension neck"	33
	52
Total	100

Distribution by Age and Sex

Distribution by age is shown in figure 1. The distribution curves for the patients with and without injury are very similar, showing a sharp peak between the ages of 30 and 60. Again, this is essentially similar to the curves obtained in the previous study.

Distribution by sex is shown in figure 2. Generally, there were more women than men in this entire series and in each group. The previously reported series, involving a much larger number of patients, also showed a predominance of women, except in the injury group.

Read at the Thirty-sixth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, August 26, 1958.

Department of Physical Medicine and Rehabilitation, Baylor University Hospital.

Medical Director, Department of Physical Medicine and Rehabilitation, Baylor University Hospital.

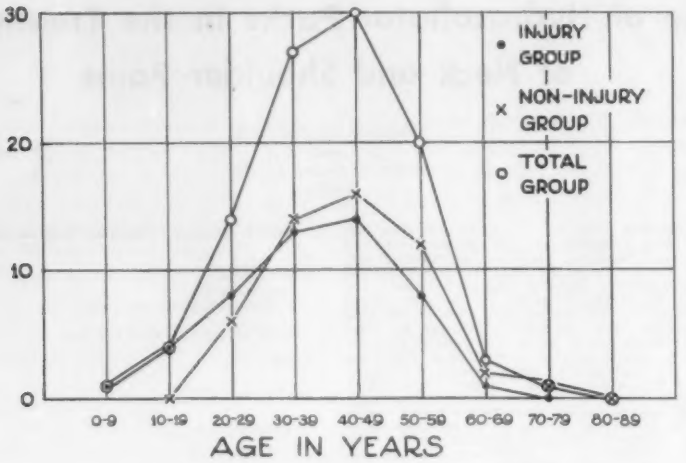


Fig. 1 — Distribution of "cervical syndrome" cases by age.

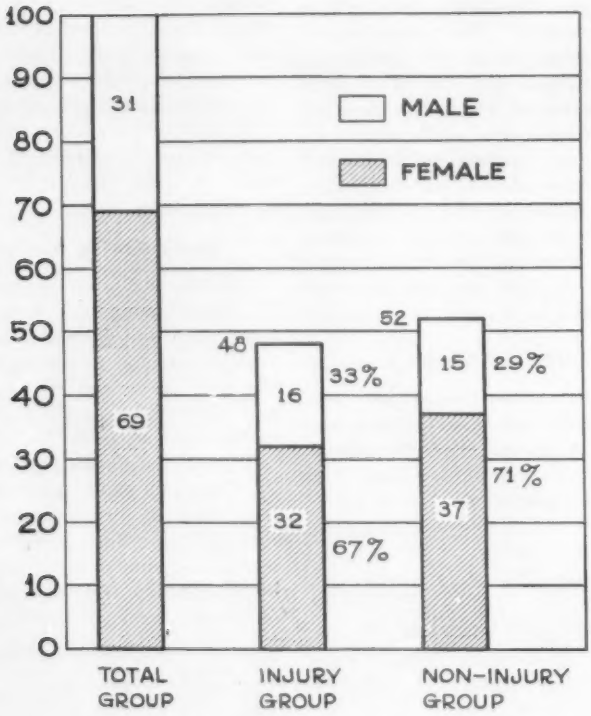


Fig. 2 — Distribution of "cervical syndrome" cases by sex.

Treatment

The treatment of patients with "cervical syndrome" consisted of the application of moist heat by means of the hydrocollator packs for 30 minutes, followed by deep sedative and frictional massage, and carefully supervised active neck exercises. The importance of rotation and lateral bending exercises with avoidance of extension was stressed. Some patients, particularly those with the diagnosis of advanced osteoarthritis, were given additional treatment with a Sayre head sling. In most cases treatment was carried out daily or every other day.

Evaluation of Results

The results of treatment were analyzed and the degree of improvement was determined in relation to the type of case. Average treatment times were also determined for the various groups. Only cases with adequate followup were used.

The degree of improvement was broken down into three categories: (1) good improvement, indicating marked or complete relief of symptoms with comparable improvement in objective findings; (2) moderate improvement, showing a variable amount of relief of symptoms with definite objective improvement; (3) no improvement.

Improvement in Relation to Type of Involvement

The degree of improvement for the main groups can be seen in figure 3. In comparing each group with the corresponding group treated by short-wave diathermy, the results were most gratifying. In the injury group, patients treated with diathermy as the form of heat showed 40.3 per cent good improvement, 47.1 per cent moderate improvement, and 12.6 per cent no improvement. Patients treated by means of hydrocollator packs as the form of heat showed 60 per cent good improvement, 29 per cent moderate improvement, and 11 per cent no improvement. In the noninjury group, patients treated with diathermy showed 41.9 per cent good improvement, 38.5 per cent moderate improvement, and 19.6 per cent no improvement. Patients treated with hydrocollator packs showed 42 per cent good improvement, 44 per cent moderate improvement, and 14 per cent no improvement. For the fibrositis group, patients treated with diathermy showed 90.9 per cent good improvement, 7.3 per cent moderate improvement, and 1.8 per cent no improvement. Patients treated with hydrocollator packs showed 86 per cent good improvement and 14 per cent no improvement. It should be

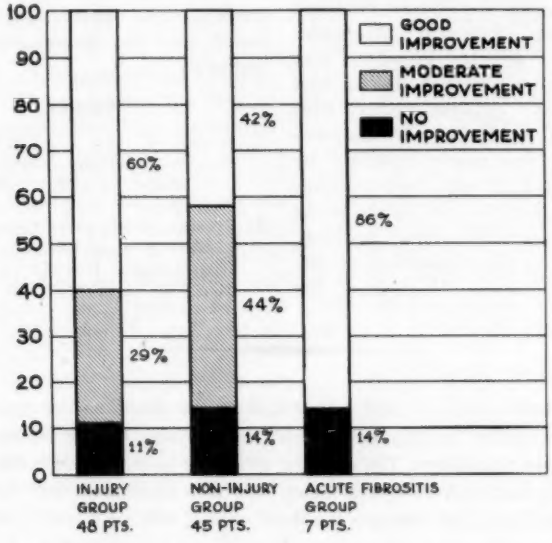


Fig. 3 — Degree of improvement in relation to type of involvement.

stressed that this apparent difference in results in the fibrositis group is not necessarily significant because of the small number of patients of this type treated with hydrocollator packs. Of the total of 7 patients, 14 per cent consists of only 1 patient, which makes the significance of this figure rather doubtful.

Average Duration of Treatment

Average treatment time for patients in the injury group was 15 treatments. Average treatment time for patients in the noninjury group, excluding acute fibrositis, was 14 treatments. These figures are slightly lower than those obtained for the corresponding groups treated with diathermy. Average treatment time for the acute fibrositis group was 9 treatments, which is slightly more than the average for similar patients treated with diathermy. Again the small number of patients in this group must be kept in mind in evaluating the significance of this difference.

Comment

The purpose of this study was to evaluate the therapeutic effects of the hydrocollator packs as the form of heat in the treatment of the "cervical syndrome." The results obtained were equal to or better than those obtained with diathermy. Practical advantages were noted for patients in whom diathermy was contraindicated. It has been noted that many patients treated with diathermy had a feeling of claustrophobia, which was never expressed by the patients treated with hydrocollator packs. The patients treated by the packs were in a comfortable supine position, which added to the relaxation of the involved musculature. Aside from the clinical effectiveness, primarily the greater comfort of the patient was the outstanding feature observed in this series of patients treated with hydrocollator packs. This finding is similar to that of Erdman and Stoner.[2] Since it is generally accepted that the penetration of heat from the use of diathermy is deeper, the extra amount of comfort to the patient treated with hydrocollator packs may explain the favorable therapeutic results.

Summary

This report was based on a comparative study of 100 cases of "cervical syndrome" which were treated by hydrocollator packs as a method of heat in place of short-wave diathermy. The series was divided into injury and noninjury groups and further subdivided according to the etiology. Therapeutic results for the injury group of 48 patients showed 60 per cent good improvement, 29 per cent moderate, and 11 per cent no improvement. For the noninjury group of 45 patients, 42 per cent showed good improvement, 44 per cent moderate, and 14 per cent no improvement. Of the acute fibrositic group of 7 patients, all but one showed good improvement. The series of patients treated with hydrocollator packs compared favorably with the series treated with short-wave diathermy. The major clinical advantage noted was the greater comfort to the patient.

References

1. Krusen, E. M.: Pain in the Neck and Shoulder, Common Causes and Response to Therapy. J.A.M.A. **159**:1282 (Nov. 26) 1955.
2. Erdman, W. J., and Stoner, E. K.: Comparative Heating Effects of Moistaire and Hydrocollator Hot Packs. Arch. Phys. Med. **37**:71 (Feb.) 1956.

. . . criticism, an open and honest look at the world and at ourselves, must be desired actively and courted assiduously. It must become the mistress of the scientist. The scientific critic must be a creative artist, wise, knowing, fair, with taste and talent, who also remembers with Petrarch that love, hate, and envy are the three poisons which kill sound criticism.

— William B. Bean

Status of the Prevocational Unit

Eugene B. Nadler, Ph.D. and Mieczyslaw Peszczynski, M.D.
Cleveland, Ohio

● Review of the literature on the prevocational unit reveals considerable debate regarding its functions and the personnel qualified to administer it. Amid the confusion, however, proponents of the various points of view agree that it consists mainly of actual work tasks selected from jobs which the disabled patient conceivably might enter. These tasks are usually, but not always, administered to the patient by occupational therapists. In its actual operation, the prevocational unit has had two major functions — therapy, to improve work tolerance and readiness, and evaluation, to assess work skills, attitudes and performance. We suggest that much of the current debate in the literature would be resolved if the prevocational unit, in its therapeutic and evaluative aspects, were subjected to systematic, controlled study. Current research in psychological, vocational, and dexterity testing holds promise of isolating most of the factors which presently operate in prevocational performance. As evaluation, the prevocational unit would no longer be required. From the therapeutic viewpoint, prevocational prescriptions could be written that would proceed from tested therapeutic methods. Thus, prevocational therapy would return to its proper place, the occupational therapy center.

The purpose of this paper is to analyze the functions presently performed by the prevocational unit with a view toward clarifying the processes involved and the roles and personnel required, and to develop a more useful perspective in vocational rehabilitation of the handicapped.

Despite the different names frequently substituted for the term "prevocational units," such as work evaluation, prevocational evaluation, and guidance testing, all these terms refer to the use of actual work tasks instead of abilities tests for evaluation of the patient's vocational potential. Upon this much, writers on the subject are agreed. The confusion begins just past this point.

Functions of Prevocational Unit

First, what functions does the prevocational unit serve? Bastable[1] recommends including in the prevocational unit a standardized series of work units to test the patient's cooperation, aptitude for detail, fine work, speed of production, and endurance. Usdane[2] recommends work samples that test individual skill and endurance. The emphasis in these functional definitions is obviously on *evaluation.*

Another group of writers, while not denying evaluative functions, include therapy or treatment as functions of the prevocational unit. Walker,[3] for example, lists counseling and training among its uses, in addition to assessment. Wegg[4] describes the work therapy program at her institution as useful "both as an estimate of ability and as an exercise medium to develop work habits, confidence, increase physical and emotional tolerance, improve strength, range of motion, coordination and dexterity." Here, there is the additional emphasis upon changing the patient.

When we assess, evaluate, or diagnose human functioning we are attempting to describe that functioning as accurately as possible using parameters relevant to our purposes. Treatment or therapy is intervention for the purpose of changing human functioning in directions we deem desirable. The effects of treatment are judged by the extent to which descriptions taken at different points in time differ from each other in desirable directions. In the real-life, in-the-field situation, evaluation and treatment go on simultaneously. In scientific work, they must be strictly separated, conceptually if not in fact.

Distinction Between Evaluation and Treatment

Much of the current debate in the literature would be resolved if the prevocational unit were subjected to systematic, controlled study, keeping rigorously in mind the distinction between evaluation and treatment. This is particularly important when evaluation, whether of a person or of a treatment technic, is quantitative. (In recent years there has been an increasing emphasis upon quantitative prevocational evaluation.[5]) Since measurement requires invariant procedures of administration of the measuring instrument at a given point in time, it can only confuse results to try to change the patient at the same

---

Read at the Thirty-sixth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, August 27, 1958.

Associate in Psychology, The Medical School, Western Reserve University; Research Psychologist, The Highland Shop, Highland View Hospital.

Associate Professor of Clinical Physical Medicine, School of Medicine, Western Reserve University; Chief, Department of Physical Medicine and Rehabilitation, Highland View Hospital.

This project-study was supported by the U. S. Office of Vocational Rehabilitation, Special Grant 21-58.

time that he is being measured. For example, a vocabulary test would be worthless as an evaluative instrument if we defined each word for the examinee prior to asking him to use it in a sentence. Similarly, weight lifting would be useless as a treatment technic if we did not allow the patient repetitions and practice. Prior definitions of words might be quite defensible as treatment, but then the test of treatment efficiency must be something other than the task used in the treatment process. Disallowing weight lifting repetitions would be a fine means of evaluation, since each patient would have an equal starting point, but it is doubtful if this would lead to much improvement.

Overlapping the current confusion between evaluation and treatment in the prevocational unit, and contributing to that confusion, is the vagueness concerning *what* is being evaluated, *what* is being changed. Work capacities, vocational potentials — these are abstract terms. Some time ago two supervisors in a sheltered shop were asked to rank 15 patients in order from best worker to poorest worker. Each patient had been under observation for at least six months by both supervisors, and the IQ range was from 50 to 117. The correlation between the two sets of rankings was almost zero. When the "good worker" variable was broken down into "quantity of work" and "quality of work" and each one rated separately, agreement between the two supervisors rose to over .80 for each component. Working backwards, it was discovered that "good worker" meant a fast worker to one supervisor, a meticulous one to the other. Incidentally, it was impossible in this instance to rank patients reliably for "cooperativeness."

Measurable and Changeable Functions

More is required, however, than mere precision of definition. We must have some assurance that a given definition represents some aspect of behavioral functioning, in order that operations of measurement can be performed or attempts at change can be initiated. A measuring device — whether a rating or a standardized test — must measure more than a mere figment of our own imagination; it must measure some aspect of the patient's functioning.

The question can be approached in a different way. What aspects of the patient's functioning *exist* to be measured? What aspects of the patient's functioning *exist* to be changed? A behavioral nosology is required, one which efficiently breaks down behavior in the prevocational unit into its component parts.

Among industrial psychologists this problem is frequently termed "job analysis" or "criterion analysis." In job analysis, the specialist makes careful observations of the human operations involved in the job, separates these observations, and then tries to put together a battery of tests which will measure the abilities involved in the same proportions as they exist on the job. This might be termed the *logical* approach to job analysis.

A more *empirical* approach which has become popular in recent years is that of factor analysis.[6] This research method, which is quite complex and time consuming in operation, usually yields results which are well worth the effort.

It may be described rather simply. The factorial approach starts from the position that the complex behaviors that we observe and try to measure are the superficial end-products of simpler and more basic processes. These end-products are *variables;* the underlying processes are *factors.* The object of factor analysis is to classify a large number of variables according to a small number of factors which generate them. The classification emerges from statistical treatment of the data; it is not *a priori.* To the extent that a factor analysis is successful, the isolated factors themselves can then be measured so as to permit prediction of a large number of behavioral variables.

Two Factor Analysis Studies

Two studies are cited here which indicate the promise of factor analysis as a first step in studying the prevocational unit.

The first, an Air Force study conducted by Hempel and Fleishman,[7] was an attempt to analyze the ability factors involved in physical proficiency and manipulative skill. Four hundred basic

trainees received 46 tests ranging from placing small dots in circles, through nut and bolt assemblies, to jumping and clicking heels. It was found that 15 factors could account for all of these performances: 9 gross physical proficiency factors, 4 manipulative skill factors, 1 nonverbal reasoning factor, and 1 factor of doubtful identification. Examples of these factors are trunk flexibility, arm-hand steadiness, and finger dexterity. It is interesting that the factors extracted represented *functional unities,* overlapping to a great extent the structural and anatomical unities frequently measured in rehabilitation work. Better tests of these factors will probably be developed, both for assessing physical proficiency and for sectioning classes for further training and development.

The second study was one conducted by Nadler and Shontz[8] at Highland View Hospital's sheltered workshop research project. The object was to classify 28 severely handicapped patients according to the basic motivational patterns which they exhibited in the sheltered workshop. Six motivational factors were discovered: drivenness, intelligence, realism, hysteria, dominance-submission, and expansiveness-constrictiveness. Three of these factors were found to be definitely related to job performance in the sheltered shop; drivenness and intelligence were positively related, hysteria was negatively related. The only one of these factors which can be presently measured by means of an objective test is intelligence; a study by Nadler,[9] using the Wechsler Adult Intelligence Scale, showed a correlation of .54 between intelligence and job performance ratings in the sheltered shop, with a sample of 53 patients. The other factors presently can be estimated only by quasi-objective methods — interviews, self-report inventories and projective tests.

Because of the above-mentioned as well as other considerations, we would recommend that the first step in research on the prevocational unit be directed toward isolating those factors involved in patients' functioning in the prevocational unit. The second step would follow immediately, that of measurement of the separate factors.

Proper Proportion of Factors

While this kind of research might give us a basis for successful evaluation, prediction requires something more. The predictive instrument must not only measure the separate factors, it must combine them in the proper proportions. An illustration will serve as an example. Yue, Moed, and Darling[10] recently reported a study of 44 young cerebral palsied adults in which the attempt was made to develop a vocationally predictive composite from a number of tests and evaluations. These investigators assigned weights to the elements in the composite, realizing, however, that these weights were arbitrary. The raw data were presented in the form of a chart, inspection of which indicated that knowledge of a patient's mental status and his physical status allowed for some prediction of vocational potential as estimated in a prevocational unit. Since no descriptive statistics were presented, but raw data were, we took the trouble of computing some of these statistics ourselves. The mental phase correlated .265 and the physical phase correlated .224 with estimated vocational potential. Only the first figure is significant at the .05 level using a one-tailed test. Neither is significant for a two-tailed test. The multiple correlation for the two predictors combined was .33. The predictive power of these evaluations is thus very low, assuming these to be unselected cases. Here, a major source of difficulty may lie in the arbitrary weightings assigned to components which themselves were very complex; within the total composite, the different evaluations probably tended to cancel each other out, thus reducing predictive efficiency.

Prevocational Prescriptions

With knowledge gained by research of the physical and psychological factors operating in the prevocational unit, the next research question could be formulated. What forms of intervention lead to changes, favorable and unfavorable, and in which specific factors? It seems reasonable to suppose that programs of work therapy, vocational counseling, and

so on lead to changes in some functions but not in others. Further, not all of these changes may be desirable. The need, therefore, is for rigorous experimentation to determine the effects of specified forms of treatment upon known factors. "Treatment" here would include, of course, in addition to the usual things, manipulations of social relationships and the social atmosphere within the prevocational setting. Only the information yielded by this kind of research can lead to prevocational prescriptions that proceed from tested therapeutic methods.

From the preceding discussion, what sorts of implications emerge regarding the present and future status of the prevocational unit? At present the prevocational unit attempts to deal with factors which are relatively unknown and which are evaluated in a relatively imprecise manner. Evaluative and treatment functions tend to be combined and likely confused in one and the same program. There is little assurance that evaluations are accurate or that treatment recommendations produce the desired results.

As knowledge is accumulated from research investigation, we can envisage a different situation. Regarding evaluation, each of the specialties on the rehabilitation team would be equipped with a set of evaluative instruments which measure factors pertinent to its own field. Application of these instruments might require a slight reorientation for some specialists, but probably no more training than is needed at present. It is well known that in any field the technologists perform routinely the tasks which earlier investigators reached only after painful effort. We have found at Highland View Hospital, for example, that certain psychological tests can be administered quite competently by capable occupational therapists under supervision. In the area of treatment, the outcome of organized research would mean that each specialty would be equipped with a set of treatment procedures of known properties.

Conclusion

It seems likely that, in this situation, prevocational work would find its greatest application, even as it does now, in the occupational therapy clinic and in the sheltered workshop, which is usually supervised at an immediate level by occupational therapists. Occupational therapists would use pure factor tests standardized on physically handicapped groups to evaluate those functions which are their own primary concern. Relevant information of a like nature would be contributed by physicians, psychologists, speech therapists, and others. In *this* setting, actual work tasks would be the primary *treatment medium,* and they would be presented in ways demanded by the results of evaluation. The same evaluative instruments could then be used to gauge the results of treatment on separate functions. In the context of a mass of accumulated knowledge, the "team approach" would take on greater meaning than it has at present.

References

1. Bastable, A. D.: Study of Homebound to Indicate Prevocational Role of Occupational Therapy. Am. J. Occup. Therap. **XII**(pt. 2):93 (Mar.-April) 1958.
2. Usdane, W. M.: Prevocational Evaluation Criteria for Severely Handicapped. Arch. Phys. Med. **38**:311 (May) 1957.
3. Walker, R. A.: Prevocational Contributions to Vocational Rehabilitation. Am. J. Occup. Therap. **XI**(pt. 2):250 (July-Aug.) 1957.
4. Wegg, L.: Role of Occupational Therapist in Vocational Rehabilitation. Am. J. Occup. Therap. **XI**(pt. 2):252 (July-Aug.) 1957.
5. Combs, M. H.; Nadler, E. B., and Thomas, C. W.: Vocational Exploration: Methodological Problems and Suggested Approach. Am. J. Occup. Therap. **XII**(pt. 1):64 (Mar.-April) 1958.
6. Fruchter, B.: Introduction to Factor Analysis, New York, D. Van Nostrand Company, Inc., 1954.
7. Hempel, W. E., and Fleishman, E. A.: Factor Analysis of Physical Proficiency and Manipulative Skill. J. Appl. Psychol. **39**:12, 1955.
8. Nadler, E. B., and Shontz, F. C.: Factor Analytic Study of Motivational Patterns in Sheltered Shop, to be published.
9. Nadler, E. B.: Prediction of Sheltered Shop Work Performance of Individuals with Severe Physical Disability. Personnel Guid. J. **36**:95 (Oct.) 1957.
10. Yue, S.; Moed, M. G., and Darling, R. C.: Prevocational Medical Evaluation of Young Cerebral Palsied Adults. Arch. Phys. Med. **38**:283 (May) 1957.

A Vocational Work Adjustment Unit: Eight Months' Experience

Edward B. Shires, M.D.
Kansas City, Kansas

● The work adjustment program which is operative at the Rehabilitation Institute of Kansas City, Mo., is described. The patients referred to this program are the hard core which the Division of Vocational Rehabilitation and other organizations engaged in the placement or training of disabled individuals have been unable to place by the usual methods. It was found, following an 11-week work adjustment program, that it was possible to place 26.6 per cent of these patients in competitive industry or training. At the present time, all individuals who are included in this percentage are in a firm placement. Although this is a small group of patients and a relatively short followup, it is believed that this study suggests an approach in the vocational rehabilitation of the severely disabled individual.

During the Rehabilitation Demonstration and Survey of Greater Kansas City, it was found that one of the major needs in the process of rehabilitation was vocational rehabilitation, particularly among the most severely handicapped, both in the area of physical and psychological or psychiatric handicaps.[1] It appeared that the employment problem of certain groups of the handicapped stems not so much from the restoration of an impaired function, but from the admittedly more complex and less-well-defined area of the role of personality factors in job adjustment.

The Rehabilitation Institute of Kansas City became interested in the problem of vocational rehabilitation and work adjustment. Rockower[2] has studied rehabilitation efforts for the mentally retarded in New York City, and has stressed that this group needs prevocational assistance and personal habit training in developing work motivation habits and a sense of responsibility. This approach has also been used by the Jewish Vocational Service of Detroit and Chicago.

In the summer of 1957, representative organizations of the Kansas City area were gathered together to discuss the need of more intensive procedures as an approach to such a problem. These included such organizations as the Mental Health Association, the Veterans Administration, the Psychiatric Receiving Center of Kansas City, the Division of Public Welfare, the Regional Health and Welfare Council, and Missouri and Kansas Divisions of Vocational Rehabilitation. As a result of this conference, it was agreed that a more intensive program of work evaluation and work adjustment was needed for certain types of the disabled. The Office of Vocational Rehabilitation specifically expressed interest in the development of this program, and also gave support, both financially and through referral of patients.

Work Adjustment Program

The work adjustment program is divided into three specific sections.

General Evaluation. First, is the general evaluation of the patient, which is completed during the first week. This consists of a social evaluation by the unit social worker, the vocational appraisal by the unit vocational counselor, the medical evaluation from the functional standpoint by the physician, and the psychological evaluation by the unit psychologist. Evaluations in speech and hearing or other areas are carried out as indicated. All previous data pertaining to the patient must be on hand prior to admission. This data consists of a recent general physical examination, records of all previous hospitalizations, and work and educational records.

Work Evaluation Period. The second and third weeks of the program embody the work evaluation period. This period is devoted to work trials conducted by the work evaluation supervisor, where the patient is given an opportunity to perform work in several selected vocational fields. The areas of exploration are based upon stated interests of the patient, as well as his apparent physical and mental abilities. These are actual

Read at the Thirty-sixth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, August 27, 1958.

Assistant Professor of Physical Medicine and Rehabilitation, University of Kansas Medical School; Assistant Director, Department of Physical Medicine and Rehabilitation, University of Kansas Medical Center, Kansas City, Kansas; Medical Director, Rehabilitation Institute, Kansas City, Mo.

This study was supported by a grant from the Office of Vocational Rehabilitation, Department of Health, Education and Welfare, Washington, D. C.

job trials in the unit. The individual is observed and his potentiality for training or placement is appraised. This period is of great assistance when the client is ready for placement, since the performance in the job trials gives the vocational rehabilitation counselor assistance in selection of the types of jobs on which the patient can adequately perform. At the end of the third week, a staff conference is held with the various individuals who have taken part in the three-week evaluation, as well as the representative of vocational rehabilitation or other referring agency. The staff at this time decides whether or not the patient will require further services of the work adjustment unit, the possibility of training or placement without further service at this time, the need of further medical or psychiatric care, which of course, would be carried on outside of the unit, or rejection of the patient as being nonfeasible for training, employment, or treatment.

Work Adjustment Period. The third part of the program is the work adjustment period. This lasts for eight weeks or less. The workshop provides a proving ground upon which skills and work habits of the patient may be tried. This program is an evaluation not of specific skills, as these may be determined in the work evaluation period, but rather of general work skills and work habits under the necessarily rigid demands of a production shop. The approach here should not be rigid but rather a variety of clear-cut production demands; some of these are authoritarian, some permissive, some demanding, and some easily fulfilled. They should be established and followed to study the effect upon the patient. Flexibility and manipulation would indicate suppleness, not a lack of organization or structure. The workshop also exists to discover the motivational pattern and trends of the individual, the various valences of his interpersonal relationships, and such objective things as work tolerance, perseverance, and responsiveness. The program for examining these factors must be flexible but carefully structured.

Role of Workshop Supervisor

The workshop supervisor must of necessity play a dual role. To the worker he is viewed as an employer with the power to hire or fire, that is, "the boss." To the Office of Vocational Rehabilitation he appears as a type of vocational counselor. To the psychologist, the social worker, and the physician he appears as an extension of their various fields adding more details and being more explicit regarding their interest in the patient.

The main problem here would seem to be that the workshop supervisor must carry the responsibility of being the extension of these various fields while at the same time being aware that his overt role is *not* that of physician, caseworker, psychologist, vocational counselor, confidant, or anything other than employer. If the supervisor needs to play any or all of these roles for the success of the program, this would imply that there are some basic inadequacies in the functioning of some other staff roles.

In playing the role of the employer the workshop supervisor needs to exaggerate production demands and attendance responsibilities, and to emphasize these to patients who exhibit a tendency toward passive dependency. The workshop supervisor who falls into the role of counselor, caseworker, or vocational placement counselor even once, loses his value to the program and to the individual patient. The work adjustment unit attempts to determine the trainability, production ability, manageability, and placement possibilities of the patient.

Adjunctive Therapy

Also, during the eight-week period adjunctive therapy is carried out: prevocational job counseling, social casework for client and family, psychotherapy, and a psychodramatic training program. The latter group meets for one hour, two times a week during the patients' eight weeks' observation in the workshop. The objective of the program is to acquaint the trainees with various aspects and requirements of job seeking, social adjustment (outside the job itself), and social work adjustment within the job

structure, including relationships with the employer or foreman and co-workers. The basic assumptions underlying the group are (1) that individuals with long-standing disability, even though they had at one time made an adequate work adjustment, forget the technics which are necessary to sustain themselves in the work milieu; and (2) that some handicapped people have never made an adequate work adjustment, consequently, are unaware of the interpersonal and social technics necessary to maintain themselves independently in the community.

The group approach is to allow the members to discuss freely either their real or imagined problems, and in this free interchange of ideas to isolate the problems which are mutual, and allow them to reach conclusions, that is; to make decisions in an atmosphere of group "togetherness." Those aspects of work with which none of the group members have had experience are handled in a didactic fashion by the group leaders. After about the tenth session, interviews are arranged with employers for group members, making it possible for them to practice. After the appointment they come back and discuss their relative successes or failures during the interview, thus, having an opportunity to learn and experience as a group. Hopefully this process demonstrates that others have similar problems and are able to solve them satisfactorily.

Placement of Patients

The length of stay in the program depends upon each patient's adjustment to the vocational situation. No one is kept in the program longer than is deemed necessary by the entire staff in their weekly consideration of the patient. If after three weeks the patient is deemed ready for employment and a job is available, he will then be placed. The role of the vocational counselor is threefold: first, evaluation of job situations found for each of the patients; second, education of the employers as to the employability of handicapped individuals; and third, prevocational job counseling with individual patients.

Following the placement of an individual in a job, a follow-up plan is developed cooperatively between the state vocational rehabilitation counselor and the staff of the work adjustment unit, so that any support needed may be given during the first period of adjustment. It is felt that at least one year's followup should ensue for each of the patients.

Present Progress of the Program

This program was initiated at the Rehabilitation Institute on October 1, 1957. The present report includes the patients who have been processed through the program from that time until July 1, 1958. During that period a total of 58 patients has been processed through the workshop. Not included in this group are four patients who were admitted but remained less than one week. They dropped out for varying reasons. One patient had grand mal epileptic seizures to such an extent that no processing could be carried out, another found a full-time job, and the other two dropped out of their own accord between the first and the fifth day.

In figure 1, the age distribution of this group of patients is illustrated. It was felt that the grouping would tend to be somewhat heavier at the older age groups, however, it will be noted from the figure that the 16-25-year-old age group contributed 24 patients; the 26-36, 18 patients; the 37-47, 11 patients, and the 48-56, 6 patients. Since placement in competitive employment is the purpose of this program, the cut-off point has been determined as being 55 years; however, one patient included in the program in its early stages was 56 years old.

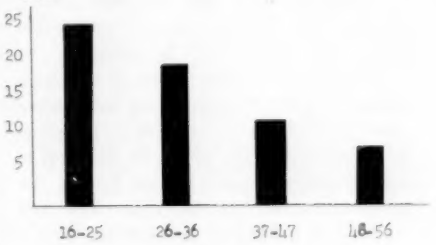


Fig. 1 — Age distribution of patients in program

In table 1 are listed the various diagnoses of the patients included in the program. Weighting of diagnoses is toward the neurological diseases with a total of 21 patients. The next largest group was psychiatric disorders, with a total of 15 patients.

Table 2 outlines the status of the patients, both at the time of the cut-off date and throughout the entire program. The majority of the patients in the group, who completed only three weeks, were those individuals, who, it was felt, would not need or benefit from further work adjustment. Only three patients in this group were placed in employment or training at the end of three weeks. Seventeen individuals were judged not able to benefit from further work in this program. The diagnoses of these patients fell within all of the groups fairly equally. Three patients dropped out of their own volition, and one with a diagnosis of schizophrenia was dismissed because it was impossible for him to keep any schedule of attendance or remain on the job when he did come in for work. Ten patients were placed in competitive industry or in a training program, with the goal of eventual employment, after 11 weeks of the work adjustment program. For two patients who have completed an 11-week program, employment still has not been obtained. One of these individuals is an epileptic. She is waiting for the results of a neurological evaluation of the control of her epilepsy, following which a job is available for her. The other patient is a male with the residuals of a cerebral vascular accident, hypertension, and osteoarthritis. This patient still has not been placed. In addition, four patients in the program are between the 3- and 11-week period. At this time it is impossible to predict how many of these will be placed.

To summarize the results of this program, 14 of the 58 patients at the present time have been placed; this figure is 26.6 per cent of the total. In addition to this, 3 patients were placed but at the present time are not working. The first of these is a 26-year-old woman with a diagnosis of psychopathic personality with schizophrenic overlay. However, it was the feeling of the team at the end of the 11-week program that this patient was employable. She was employed as a nurse's aide in the nursery of one of the hospitals in Kansas City. About two months after this the patient was discharged for using drugs while on the job. Since that time she has failed to return to or maintain contact with the Rehabilitation Institute. It does not appear at this time that anything further can be done for this patient.

Table 1: Diagnoses of Patients in Program

Neurological Diseases	No. Patients
Cerebral palsy	6
Chronic brain syndrome, traumatic	2
Epilepsy	6
Cerebral vascular accident, hemiplegia	3
Bulbar poliomyelitis	1
Cerebellar atrophy	1
Encephalitis with right hemiparesis	1
Quadriplegia, partial, traumatic	1
Disabilities of Bone, Joint, or Muscle	
Residuals of poliomyelitis	6
Rheumatoid arthritis	1
Osteogenesis imperfecta	1
Chronic lumbosacral strain	1
Hip fusion	1
Arthrodesis, knee, with schizophrenia	1
Above-elbow amputation, right	1
Below-knee amputation with hypertension	1
Above-knee amputation, left	1
Thumb and index and middle finger amputation, right hand	1
Cardiac Disease	
Congenital heart disease	1
Hypertensive cardiovascular disease	1
Special Senses	
Stutterer	1
Deaf with severe trauma, left hand	1
Hearing loss with speech defect	1
Psychiatric Disorders	
Schizophrenia	5
Character disorder	1
Psychoneurosis	2
Mental deficiency with schizoid personality	1
Mental retardation	6
Miscellaneous	
Lupus erythematosis	2
Emphysema	1

Table 2: Status of Patients

	No. Patients
Completed 3 weeks	20
Completed 11 weeks	10
Dropped from program in less than 3 weeks	5
Dropped from program in 3 to 11 weeks	3
Placed or in training after 3 weeks	3
Placed or in training after 11 weeks	10
Placed or in training in 3 to 11 weeks	1
Completed 11 weeks (still in program workshop)	2
Program in progress for 3 to 11 weeks	4

The second patient is a 27-year-old woman with a diagnosis of schizophrenia, chronic reaction, paranoid type. Observation of this patient during the 11-week program and psychologic and psychiatric evaluation led the staff to feel that her disease was sufficiently in remission for her to be employed. She was placed in a nurse's aide training program. After three months, the patient, although doing quite well with her training, quit. The supervisor reported that the patient's work was adequate, that they were not contemplating firing her, and that they even had asked the patient if she would like some other job in the hospital. Since that time there has been one additional contact with her and she was to be placed as an aide in a nursing home. The patient went to the nursing home on the appointed evening she was to begin work; she stayed one hour and walked out. It was the feeling of the vocational counselor that further attempts at placement at this time should not be made, and that she should be referred to the Psychiatric Receiving Center for further evaluation, and perhaps treatment.

The third patient is a 28-year-old man who had completed the 11-week program. His right arm had been amputated 3 inches below the elbow, but was well fitted with a prosthesis. He was employed as a spray painter in a plastic industry in Kansas City. This patient, however, was caught in a general lay-off, and because he had little or no seniority he was discharged. He returned to the vocational counselor at the Rehabilitation Institute, and attempts are being made at this time to place him again. It is felt that this will probably not be difficult since the patient's record in his previous job was good.

In returning once again to table 2, which shows that 12 individuals who completed the 11-week program were not placed, it will be noted that 10 individuals (45.4 per cent) who completed the 11-week program were placed or are in training. If again we calculate the number of individuals who progressed beyond the three-week period, which would be a total of 26, and the number of placements following those which have occurred at the three-week period, we find that 11 (42.3 per cent) of these have been placed or are in training.

The various types of activity and work in which these individuals are at the present time employed have not been charted. However, it varies in its complexity. Some of these are: parking lot attendant, book mender, mechanic in an automatic transmission company, nurse's aides, an apprentice as a tool and die maker, packing and shipping and receiving clerk, chemist in a water laboratory, and college student.

Summary

The work adjustment program which is operative at the Rehabilitation Institute of Kansas City, Missouri, has been described. The patients referred to this program are the hard core which the Division of Vocational Rehabilitation and other organizations engaged in the placement or training of disabled individuals have been unable to place by the usual methods. It was found, following an 11-week work adjustment program, that it was possible to place 26.6 per cent of these patients in competitive industry or training. At the present time, all individuals who are included in this percentage are in a firm placement. Although this is a small group of patients and a relatively short followup, it is believed that this paper suggests an approach in the vocational rehabilitation of the severely disabled individual.

References

1. Shires, E. B., and Wahl, A.: Rehabilitation Survey and Demonstration of Greater Kansas City: A Research Study Being Conducted by Community Studies, Inc., of Kansas City, Missouri. Arch. Phys. Med. 38:315 (May) 1957.
2. Rockower, L. W.: A Study of Mentally Retarded Applicants for Vocational Rehabilitation in New York City, in S. G. DiMichael, Vocational Rehabilitation of the Mentally Handicapped, U. S. Government Printing Office, Washington, D. C., 1950.

New Apparatus: A Therapeutic Wheelchair for Above-Knee Amputees

Samuel G. Feuer, M.D.
Brooklyn

● A wheelchair is described which can be adapted in selected cases for prophylactic or therapeutic management of above-knee stumps where the patient remains confined to bed or wheelchair.

Many above-knee amputees seen at various hospitals and rehabilitation centers enter with contracture deformities of the stump. Such cases are still present, in spite of the modern concept of the proper postoperative management, because many present obstacles difficult to overcome. Other than contractures resulting from surgery, there are many reasons why these deformities develop. Generally they can be handled and prevented by intelligent management. However, in a large group of cases, since routine methods cannot be pursued, special procedures should be provided to aid in the prevention of flexion contractures and thus shorten the period of rehabilitation.

Increasing numbers of geriatric patients are being seen in hospitals for acute and chronic conditions. Many of these patients, because of diabetic gangrene, peripheral vascular diseases associated with arteriosclerosis, embolic accidents, and similar conditions, come to surgery for amputations in greater numbers each year. In this group, convalescence is slow, considerable amount of debility exists prior to surgery, the patients are suffering from other systemic diseases, or postoperative complications have occurred. Thus, initiating the routine program in preparing these patients for ambulation is unfortunately delayed in many cases. It is not possible to keep these people constantly exercised during the time they are awake, nor is it possible to have them sleeping on their abdomens at all times. Many of them are kept in conventional wheelchairs for prolonged periods, thus leading to eventual flexion deformities of the stump.

A special wheelchair has been designed to assist in the prevention of contracture deformities of above-knee stumps by proper positioning and exercise from the seated position. This wheelchair can be used for the following conditions:

1. Double above-knee amputations.
2. Postoperative complications.
3. Concurrent injury or disease in other extremity.
4. Concurrent illnesses, such as heart trouble or hypertension.
5. Postoperative debility usually associated with senility, nutritional disorders, anemia, or other conditions.
6. Poor motivation (emotional instability, psychological trauma).
7. Any postoperative above-knee amputation where it is desirable to get the patient out of bed as soon as possible (to prevent venous stasis in other limbs, pulmonary complications, psychological deterioration, or similar complications).

This wheelchair, a conventional 18-inch wide type has been adapted to accommodate a divided, 19-inch long foam rubber, hinged, padded, movable seat, each half with a pair of web straps and supported by means of a movable shaft attached to the rear axle. As noted in figure 1, either half can be dropped at any angle from 90 to 180 degrees. For a double amputee this can be done alternately for each stump. It is thus possible for an amputee to sit on one buttock and extend his stump to 180 degrees without any strain or serious discomfort.

For patients in whom flexion deformities have already occurred, the chair can be adapted therapeutically in the following fashion: As noted in figure 2, weights can be attached to a hook under the seat and kept on for as long as desired. With the stump immobilized by the web strap, a specified amount of traction occurs for any prescribed period of the day. Secondly, it can be utilized for assistive and resistive

Director, Physical Medicine and Rehabilitation, Coney Island and Long Island College Hospitals.

Fig. 1

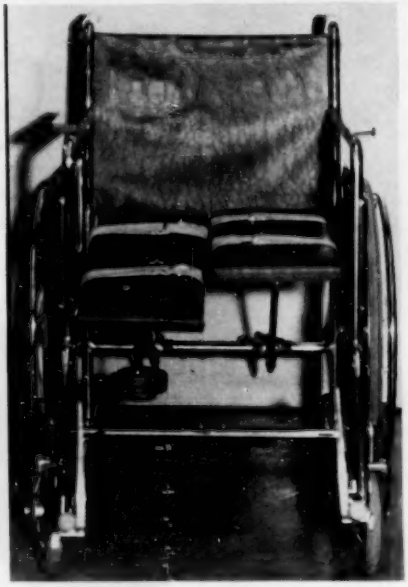


Fig. 2

exercises by attaching weights through a pulley system to the hook under the seat, thus permitting the patient to exercise from the seated position. Either half of the seat can be allowed to swing freely on its hinge or can be locked in any position (fig. 3).

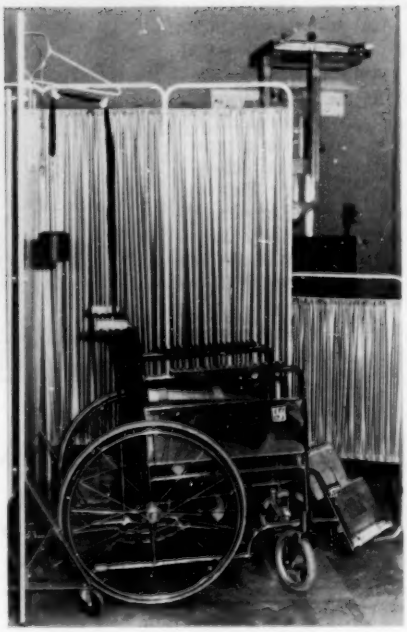


Fig. 3

Acknowledgment: The author wishes to thank the Mayflower Surgical Company of Brooklyn, N. Y., for their invaluable assistance in preparing the sketches and fabricating the working model of this wheelchair.

HELP US KEEP THE THINGS WORTH KEEPING

It doesn't take much to remind you of why you want peace. You know it in your heart every time you look at your daughter. You know we *must* keep the peace.

But knowing isn't enough. It takes *doing*. Fortunately there is something you can do.

Peace costs money. Money for strength to keep the peace. Money for science and education to help make peace lasting. And money saved by individuals to help keep our economy strong.

Your Savings Bonds, as a direct investment in your country, make you a Partner in strengthening America's Peace Power. But the most important thing they earn is peace. They help us keep the things worth keeping.

Think it over. Are you buying as many as you *might?*

HELP STRENGTHEN AMERICA'S PEACE POWER

BUY U. S. SAVINGS BONDS

The U.S. Government does not pay for this advertising. The Treasury Department thanks The Advertising Council and this magazine for their patriotic donation.

editorial

OFFICIAL JOURNAL
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION
AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

The Registry Examination as an Educational Instrument

In every field of education it is necessary to review and evaluate the educational program periodically. Objective measures of educational accomplishments make such reviews more valuable. The American Registry of Physical Therapists was organized in 1936 under the sponsorship of the American Congress of Physical Medicine and Rehabilitation to establish a national examination for physical therapists who had been graduated from approved schools of physical therapy and to help to improve the standards of education of physical therapists. Since 1941, Doctor C. d'A. Gerken has been the psychologist in charge of the construction of this examination. In an article in this issue of the *Archives of Physical Medicine and Rehabilitation,* Doctor Gerken discusses the use of the data accumulated by the Registry Examination (REX) to assist the schools of physical therapy to evaluate the strengths and weaknesses of their educational programs. The preparation of this examination for seventeen years under the guidance of one testing psychologist has resulted not only in the development of a consistently reliable test but also in the accumulation of information which can be used by each school to strengthen its curriculum.

The REX is composed of 300 questions distributed in twelve fields of subject matter in physical therapy approximately proportionally to the emphasis placed on those subjects in the minimum essentials established by the Council on Medical Education and Hospitals of the American Medical Association. The test, therefore, provides for a balanced evaluation of the knowledge of students of physical therapy. These questions have been carefully selected to be discriminating. The range of difficulty of questions is great enough that it will measure the knowledge of even the best students. There are no questions which all physical therapy students should answer correctly. This careful selection of test items tends to accentuate the difference between the better and the poorer students. Moreover, evaluation of this test over the past seventeen years has shown it to be highly reliable in predicting knowledge of physical therapy. The coefficient of reliability as determined by split-half testing has been .88-.92 for the various additions of the test. Much longer tests or more involved tests might further increase the reliability but such improvements in reliability would be slight.

Twelve hundred four graduates of 35 schools of physical therapy took the REX in 1956 and 1957. The resulting scores of these examinations provide for each school an index of its relative ranking in the training of its students in these subjects. Doctor Gerken has made this information available so that each school can use this data if it wishes for evaluation of its program.

There are a number of comparisons which might be made from this data. Obviously if the average grades of students from any school fell below the passing grade on any subjects there is

need for an improvement in the teaching of that subject. Doctor Gerken points out that the median scores of all graduates fall below the passing score for radiation therapy and electrotherapy. The median score for massage is barely above the passing score. It appears that there is a general need for improvement in these fields of knowledge. Physics, radiation therapy and hydrotherapy show the greatest divergence between the highest and the lowest scores. Kinesiology is the strongest course in all schools and the one course in which there is the greatest consistency from school to school. Therapeutic exercise, applied physical therapy and physiology also show good consistency which probably is a reflection of the emphasis placed on these subjects in recent years.

Each school has certain strengths and certain weaknesses in its curriculum which become evident when evaluated by the data from the REX. Only two of the 35 schools show a rank above the average and above the passing score in all twelve subject areas. No school ranged below the average on all subjects. At least 33 schools have subject areas in which teaching might be improved.

These data from the REX provide an external test of the effectiveness of the teaching program of each school. If the average grades of students from one school are below the average for all schools in any subject area the teaching of that subject might well be reviewed. This delineation of subjects in which the teaching needs to be evaluated makes the REX especially valuable.

The Council on Medical Education and Hospitals of the American Medical Association is planning to reactivate the team surveys of schools of physical therapy. These accreditation surveys have lagged in recent years. Although the primary purpose of the surveys is to see that each curriculum meets the minimum standards set by the Council the survey teams could perform an additional service by advising the faculty of each school regarding its curriculum. If the data from the REX were made available to the survey team of the AMA Council on Medical Education and Hospitals at the time of its visit to a school the team could evaluate the program more efficiently and be more helpful in providing advice on improvement of the teaching program.

— *Frederic J. Kottke, M.D.*

"I hold that while man exists, it is his duty to improve not only his own condition, but to assist in ameliorating mankind . . ."

— ABRAHAM LINCOLN

Address given at Cincinnati, February 12, 1861

abstracts

Post Hemiplegic Reflex Sympathetic Dystrophy. E. Moskowitz; H. F. Bishop, and K. Shibutani. J.A.M.A. **167**:836 (June 14) 1958.

The authors discuss six cases of reflex sympathetic dystrophy in the upper extremity encountered over a period of three years during the rehabilitation of a large number of patients with cerebrovascular lesions.

Differentiating the swollen, cyanotic hand due to stasis or an unrecognized thrombophlebitis from the syndrome of reflex sympathetic dystrophy may be difficult.

In the latter, the authors stressed the findings of less pronounced swelling without pitting edema, the rather marked trophic changes in the skin, and finally the x-ray evidence of spotty demineralization in the carpal bones.

Stellate ganglion blocks were the treatments used by the authors and if multiple attempts at this failed, then a high thoracic sympathectomy was performed.

Comparative Effects of Relaxant Drugs on Human Skeletal Muscle Hyperactivity. Francis A. Vazuka. Neurology **8**:446 (June) 1958.

The effect of Equanil, Flexin and Robaxin on the reflex activity in eleven male patients with varying degrees of spasticity was tested employing the EMG to record the amplitude of the electrical action potentials induced by standardized myotatic, nociceptive and stretch stimulation.

Much information was gathered and tabulated on numerous tables and graphs. However, it was difficult to interpret this data because of incomplete explanations of the symbols and figures used.

The reader would conclude from this article that all three drugs reduce spasticity, but there was too little objective, well controlled evidence to indicate the magnitude of this reduction.

Mice, Men, and Fallout. Miriam P. Finkel. Science **128**:637 (Sept. 19) 1958.

The author postulates three possible extrapolated curves expressing dose-response based on three different assumptions in projecting curves from the data available.

The study reported was concerned with the effect of injected strontium 90 on the lives of mice in the exposed generation only. The lowest injected dose that resulted in a statistically different life-span was 44 microcuries per kilogram. The lowest dose that induced a significantly higher number of osteogenic sarcomas was 200 microcuries per kilogram and the lowest dose at which other tumors in blood forming tissues appeared earlier than in the control was 88 microcuries per kilogram or more.

Since this information indicates there may be a threshold, two methods are presented for extrapolating the data for use in interpreting data regarding humans.

First, comparing the lowest doses of injected strontium 90 and of radium 226 which increased the incidence of osteogenic sarcomas gives a ratio of 37 to 1. Comparing the largest injected doses of each which did not increase the incidence of osteogenic sarcomas gives a ratio of 15 to 1. This can then be compared with the information available regarding radium exposure in humans, so that a range of 6 to 15 microcuries of strontium 90 would appear to be the minimum effective dose.

Second, by comparing the data for effect of strontium 90 on mice with information regarding its effect on larger animals, one can extrapolate to the effect on an animal as large as a man. It would appear that strontium 90 is 7 to 12 or 9 to 14 times more effective in man than mice and thus 5 to 10 microcuries of strontium 90 as a "body burden" would be the minimum effective dose.

The author's conclusion is that the present contamination from strontium 90 from fallout is so very much lower than these levels that it is extremely unlikely to induce even one bone tumor or one case of leukemia.

Therapy of Acute, Chronic and Mixed Hepatic Porphyria Patients with Chelating Agents. H. A. Peters; P. L. Eichman, and H. H. Reese. Neurology **8**:621 (Aug.) 1958.

This paper re-emphasizes the importance of chelation therapy in hepatic porphyria.

Forty-seven patients were studied, 32 having acute porphyria, one with chronic porphyria, five with mixed porphyria and 12 paraporphyrics. Thirty-seven of these patients were treated with chelating agents, 31 re-

sponding favorably, three showing equivocal response and three were listed as failures.

The symptoms of porphyria are thought to be due to a zinc, copper, or other cation blocks of the several metallo-enzyme systems. Exhaustion of certain portions of the body's natural chelation defenses and subsequent depletion of porphyrins for purposes of chelation may likewise impoverish the metabolism of the body and affect maintenance of myelin and cytochrome systems that inter-relate to a "porphyrin pool." Artificial chelation is felt to replenish the depleted chelation reserves of the body, thus restoring more normal metabolism.

Resistance of Salmonella Typhimurium to Tetracyclines. C. R. Huey, and P. R. Edwards. Proc. Soc. Exper. Biol. & Med. 97:550 (Mar.) 1958.

The problem of development of resistance of bacteria to antibiotic substances is so well known as to need no comment. One hundred strains of salmonella typhimurium isolated from fowl and swine prior to 1948, before inclusion of antibiotic substances in animal feeds and before the broad spectrum antibiotics came into general use, as well as 100 strains isolated from man and fowl subsequent to January 1956, were tested with tetracycline, oxytetracycline, chloramphenicol, dihydrostreptomycin, polymyxin B, penicillin, and erythromycin. Blood agar base plates were streaked with individual cultures and antibiotic discs of intermediate concentration were placed on the surface as soon as the inoculum was dry. Results were read after overnight incubation at 35 C.

The only significant difference noted in reactions of cultures was obtained with tetracycline. Among cultures isolated prior to 1948, no resistant cultures were found. Among recently isolated strains, nine per cent from fowl and five per cent from man appeared completely resistant. Cultures which were resistant to one tetracycline were resistant to all. The demonstration of resistance in twice as many cultures derived from fowl as in cultures derived from man is probably related to the inclusion of tetracyclines in poultry feeds.

Renal Function in Human Pregnancy. 1. Changes in Glomerular Filtration Rate and Renal Plasma Flow. W. J. Dignam; P. Titus, and N. S. Assali. Proc. Soc. Exper. Biol. & Med. 97:512 (Mar.) 1958.

The purpose of the reported study was to investigate renal plasma flow and glomerular filtration rates in the same individuals at various periods of gestation and after delivery. Nine patients with normal pregnancy and without any history of cardiovascular or renal disease were studied once during each trimester of the pregnancy as well as six to eight weeks after delivery.

Renal plasma flow rose in each patient from the first to the second trimester with a further but a less striking rise between the second and third trimester of pregnancy. In the postpartum period, renal plasma flow fell to values below those observed in the first trimester of pregnancy. The pattern of change was the same as that seen with PAH.

The authors conclude that these changes provide conclusive evidence against the thinking that pregnancy imposes an added burden on the kidneys.

Infection of Human Volunteers with Type 2 Hemadsorption Virus. Thomas E. Reichelderfer; Robert M. Chanock; John E. Craighead; Robert J. Huebner; Horace C. Turner; Walter James, and Thomas G. Ward. Science 128:779 (Oct. 3) 1958.

The authors studied the results of inoculation of human volunteers with this recently isolated virus of the myxovirus group. Each of 32 healthy adult males received a total of one ml. of undiluted tissue culture fluid containing type 2 hemadsorption virus in the posterior oropharynx, palpebral conjunctivae and nose. The virus was first isolated from throat swabs on the third day and two showed virus for the first time on the ninth day. A total of 24 men shed the virus in the course of the study. A total of 25 men developed a rise in antibody for this virus.

The first symptoms of illness appeared on the sixth day, the time at which the greatest number of volunteers had the virus in the upper respiratory tract. The illness was generally mild, recovery occurring in two to three days. Symptoms were nasal obstruction and discharge, coughing and sneezing, while some men also complained of sore throat, headache, ocular complaints, vague chest pain after coughing, and chilliness. A few also complained of aching, anorexia, vomiting, and hoarseness. Physical findings were reddened, edematous pharynx, rhinorrhea that was serous and later mucoid, inflamed nasal mucosa and inflamed tonsils. Less common findings were mild conjunctivitis and low grade fever. A total of 18 volunteers developed clinical illness.

The Bulbocavernosus Reflex 1. Electromyographic Study of Normal Patients. W. H. Rattner; R. L. Gerlaugh; J. J. Murphy, and W. J. Erdman II. J. Urol. 80:140 (Aug.) 1958.

The bulbocavernosus reflex is being stressed as a measure of the integrity of the second, third, and fourth sacral segments. Pressure of the glans penis resulting in contraction of the anal sphincter has been noted as positive evidence of an intact sacral cord.

In this study eleven normal patients were examined. A surface electrode was placed at the anal sphincter and the electromyogram produced by voluntary contraction of the anal sphincter and by the reflex was obtained. Three other patients were studied with needle electrodes.

In none of these patients was there any significant rise of potential recorded reflexly at the sphincter. It is suggested that this reflex may have been inhibited by supra-segmental pathways and if so the reflex may be used to evaluate progress of neurologic damage. It may also be conceivable that the reflex is not a reliable measure of intact sacral spinal segments.

Use of Sympathetic Blocks in Orthopedic Surgery. John J. Brennan. J.A.M.A. **168**:504 (Oct. 4) 1958.

Reflex sympathetic dystrophy is classically manifested by pain, hyperesthesia, vasomotor dysfunction, edema in most cases, pseudomotor disturbances in some cases and trophic changes in the later stages.

The author reviewed the charts of 100 patients treated with sympathetic blocks. Patients were selected for the blocks if they showed any of the above symptoms, if they showed slow progress in physical therapy, or empirically as an adjunct to physical therapy.

The average age of the patients was 30.3 years. Most patients received more than one block, one patient receiving 20. Complications included two cases of "transient aseptic meningitis" and one pneumothorax.

The author states that 53 per cent of the patients had "marked and rapid improvement in progress in physiotherapy." Twelve of the better case histories were reviewed. The patients were also grouped according to symptoms, the author giving his subjective impression of the patients' responses to this procedure. This study is not well selected or controlled and hence no conclusions can be drawn.

Pronator Syndrome. H. P. Kopell, and W. A. L. Thompson. New England J. Med. **259**:713 (Oct. 9) 1958.

The pronator syndrome is a compression neuropathy of the median nerve as it passes through the two heads of the pronator teres and under the flexor sublimis. The pressure is described as due to hypertrophy of the pronator or to the presence of abnormal fibrous bands extending from the sublimis. The symptoms that present depend on the extent of the block. The cases described in the literature indicate tenderness at the thenar eminence at the point where the median nerve becomes the recurrent branch of the thenar muscles. This area is a region of strain on wrist and hand motion if the nerve is fixed at the elbow by pronator pressure.

One case is presented in which hydrocortisone injection helped make the diagnosis. At surgery an anamolous fibrous band was seen and a swollen median nerve proximal to the obstruction. The patient received relief obtained by hydrocortisone injections in ten weeks post surgery.

Electrophoretic Analysis of Exercise Proteinuria. J. Nedbal, and V. Seliger. J. Appl. Physiol. **13**:244 (Sept.) 1958.

Forty-one young males, average age 19, were exercised on a treadmill at the speed of 4.0-5.3 meters per second for a period of 5 minutes. Pulse rates and blood pressures were recorded before, during, and for 30 minutes after exercise. Urines obtained before, and 30 minutes after exercise were analyzed for protein content. The proteinuria ranged from 16 to 160 mg. per cent and there was no correlation with pulse rates.

The exercise urine was concentrated to blood levels by dialysis and then subjected to paper electrophoresis. The protein spectrum was practically identical to that of the blood serum of the subjects. The authors conclude that in functional exercise proteinuria the entire plasma protein simplex passes the glomerular filter. The provoking factors are believed to be decreased renal blood flow and increased blood acidity.

Amputation Stump Pain. T. J. Canty, and E. E. Bleck. U. S. Armed Forces M.J. **9**:635 (May) 1958.

The authors present a review of the medical histories of over 7,000 amputees treated at the Navy Amputation Center, U. S. Naval Hospital, Oakland, Calif., during the past twelve years. The authors state that the most common complaint of the amputee seeking medical care is stump pain. A discussion of the cause of painful amputation may be divided into three general headings: (1) conditions prior to surgery, (2) immediate postoperative pain, (3) late postoperative pain.

Conditions prior to surgery which are a factor in the production of postsurgical pain are conditions such as gangrene as a result of thromboangina obliterans accompanied by severe pain. The authors point out that congenital amputees, as a rule, have little or no pain.

Late postoperative pain of a major degree is generally caused by (1) improper fit and/or alignment of the artificial limb, (2) dermatological conditions of the stump, (3) bursitis of the amputation stump, (4) osteomyelitis in the stump, (5) trauma, (6) chronic anoxia of the terminal end of the stump, (7)

osteoma and/or spurs, (8) neuroma, or (9) phantom limb.

The authors elaborate to some degree on all of the nine conditions listed. They point out that though all amputees have phantom sensation of some degree following amputation, only a very small percentage (2 per cent of the amputees treated at this center) experienced phantom pain of a major degree which made rehabilitation impossible.

The authors feel that pain in amputation stumps arises from a variety of local causes effecting the stump, and each patient must be evaluated individually. The proper treatment of amputation stump pain is to remove the cause of irritation in the stump.

Roentgenographic Diagnosis and Surgical Treatment of Basilar Artery Insufficiency. E. Stanley Crawford; Michael E. DeBakey, and William F. Fields. J.A.M.A. **168**:509 (Oct. 4) 1958.

It is well known that atheromatous occlusions of the internal carotid artery in the neck and the great vessel, the common carotid and vertebral arteries, at their origin from the aortic arch produce definite clinical entities.

The authors have restored the normal circulation in 43 patients with lesions occurring in the internal carotid, innominate, subclaviar, and left common carotid arteries and also on 8 patients with occlusive lesions in the subclavian artery proximal to the vertebral artery. This paper deals with the surgical treatment of an occlusion in the vertebral artery which produced symptoms the authors thought were suggestive of basilar artery insufficiency.

The title of the article is misleading, the principle message being a plea for a more aggressive attack on cervical arterial insufficiency syndromes since the authors feel that the obstructive lesion causing strokes is very frequently located extracranially. They also indicate that these lesions are quite easily diagnosed by arteriography.

Radio Control of Ventricular Contraction in Experimental Heart Block. M.Verzeano; R. C. Webb, Jr., and M. Kelly. Science **128**:1003 (Oct. 24) 1958.

The authors describe the equipment and technic for stimulation of the ventricular myocardium of dogs without external wiring or connections. The device consists of a radio transmitter connected to a loop antenna in the floor of a non-metallic cage, a simple receiver using a Zener diode, and a stimulating loop.

The receiver was placed between the latissimus dorsi muscle and the rib cage over the 3rd, 4th, and 5th ribs, the insulated output wires being connected to the myocardium and latissimus dorsi muscles. The myocardial lead was negative to the other lead during stimulation.

An artificial heart block was created by section of the bundle of His, and the receiver was placed in position. Records are shown of electrocardiograms made subsequently showing spontaneous contractions and contractions initiated by stimulation.

Reticular Formation Interactions. K. Koizumi; J. Ushiyama, and C. M. C. Brooks. Am. J. Physiol. **195**:1 (Oct.) 1958.

Spinal reflexes were evoked by stimulation of muscle afferents either from the gastrocnemius or biceps femoris of anesthetized or decerebrate cats. The reflexes were recorded from the 7th lumbar or 1st sacral ventral roots.

Stimulation of the reticular formations using single shocks of 3-10 volts of 3-7 milliseconds duration had an inhibitory effect, often followed by facilitation. Similar effects were obtained by stimulation of the ipsilateral paramedian lobe of the cerebellum, dentate nucleus and ansiform lobe. When the reticular formation and other areas were stimulated together, there was greater effect on inhibition and facilitation. When the stimulation of other areas had no detectable influence on the reflex, the reaction to the reticular formation stimulus was not affected. Stimulation of the auditory cortex provoked inhibition.

An interesting observation is noted but not documented, that sound stimuli or touching the limbs and various parts of the body had an effect of inhibiting discharges of reticular formation units for over 200 milliseconds.

Thrombophlebitis in Patients with Severe Poliomyelitis. B. G. Ferris; B. McNichol, and G. Sutin. New England J. Med. **259**:971 (Nov. 13) 1958.

Of 98 patients who were admitted to a respiratory unit with respiratory poliomyelitis, twelve developed thrombophlebitis. In three of these a direct cause was evident, therefore only the remaining 9 or 9.2 per cent are discussed. The interval between the onset of poliomyelitis and that of thrombophlebitis varied from 10 days to four months with six appearing within six weeks.

Hemoconcentration as indicated by hemoglobin values was significantly higher at the time of the phlebitis than in those patients who did not develop the disease. The contribution of chronic hypoventilation and dehydration to hemoconcentration is discussed. The importance of circulatory stasis as an important cause is borne out by the greater frequency of the disease in the left leg. No mention is made of the possible contribution

of trauma as may be caused by stretching or manipulation of these severely paralyzed patients.

Reported incidences at other respirator centers confirm the importance of thrombophlebitis as a complication in severe neuromuscular disability.

Regulation of Carbohydrate Metabolism in Spinal Cord Injuries. Meyer Brown; Joseph Bernsohn, and John Finkle. Neurology 8:547 (July) 1958.

When the spinal cord is injured or transected the same defects in innervation occur in structures supplied by the autonomic nervous system as are seen in structures supplied by the somatic motor nerves. The present study is concerned with the effects of spinal cord injuries on the regulatory mechanisms of carbohydrate metabolism.

The authors obtained oral glucose tolerance curves, intravenous glucose tolerance curves, insulin tolerance curves, and blood glucose curves after the injection of 0.5 cc. of 1/1000 adrenalin in 39 patients with cervical cord lesions, 30 patients with dorsal cord lesions, 17 patients with lumbar cord lesions and in 17 normal patients.

There was no recorded difference in any of the mentioned tests in the patients with dorsal and lumbar lesions compared with the normals. Following the oral glucose tolerance tests the patients with cervical cord lesions achieved significantly higher blood sugar levels and maintained them for a longer period of time and after the injection of adrenalin had significantly lower blood sugar levels than the dorsal, lumbar and normal patients.

The authors fail to give an adequate analysis of their results, thereby allowing the reader to draw his own conclusions.

---

we meet . . .

in minneapolis . . .

in 1959 . .

37th Annual Session, American Congress of Physical Medicine and Rehabilitation, Minneapolis, Hotel Leamington, August 30-September 4, 1959.

book reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

THE PHYSICAL TREATMENT OF VARICOSE ULCERS. A Practical Manual for the Physiotherapist and Nurse. By *R. Rowden Foote,* M.R.C.S. Cloth. Price, $4.00. Pp. 125, with illustrations. The Williams & Wilkins Company, Mt. Royal & Guilford Aves., Baltimore 2, 1958.

This pocket-sized manual discusses the incidence, pathology and nonsurgical treatment of ulcers of the lower extremity resulting from disorders of the veins. These lesions may be either varicose ulcers, which are associated with varicosity of the superficial veins of the lower extremity, or "venous ulcers," which are secondary to thrombophlebitis of the deep veins. The author stresses that "Normal weight, personal cleanliness, active exercise, proper and careful use of compression bandages, and a will to get better are essentials in treatment." The importance of elastic supportive bandages is emphasized, in the form of either dry or "sticky" bandages. The author states that treatment by the physical therapist should be delayed until the ulcer is healed or almost healed by use of compressive bandages. The technic of bandaging, massaging and exercising is presented in detail. The final chapter of the book, entitled "Electrical Adjuncts to Treatment," is written by Miss T. Wareham, M.C.S.P., who discusses briefly the technics of using ultraviolet radiation, electric stimulation, ultrasound, shortwave diathermy and iontophoresis. Ultrasound is said to be particularly useful in hastening absorption of small hematomas, which may develop from rupture of varicosities or after stripping operations on the superficial veins.

The book is well illustrated. While designed primarily as a manual to guide physical therapists and nurses, it could be read with interest by physicians faced with the problem of caring for these patients. Success in the treatment of these patients generally depends on careful attention to minute detail, and such detail is well presented in this little volume. Some of the materials used in treatment are referred to by proprietary names, but their approximate equivalent generally is available under other names in countries outside the United Kingdom. *(G. Keith Stillwell, M.D.)*

LUMBAR DISC LESIONS. Pathogenesis and Treatment of Low Back Pain and Sciatica. By *J. R. Armstrong,* M.D. Cloth. Price, $12.00. Pp. 244, with illustrations. The Williams & Wilkins Company, Mt. Royal & Guilford Aves., Baltimore 2, 1958.

The author is an orthopedic surgeon at the Metropolitan Hospital, Lambeth Hospital, and Manor House Hospital in London and also has several other hospital appointments. He states that he has written this book on the lumbar disc because of his long-time interest in disorders affecting the lower part of the back. His chapters on the anatomy, function, and pathology of lumbar disc lesions are interesting, well written and well illustrated, and include some two or three color diagrams and also roentgenographic prints. A considerable portion of the book is devoted to a discussion of the clinical picture of disc lesions, and to the detailed examination essential for differential diagnosis.

In the two chapters devoted to conservative treatment, the author emphasizes the importance of rest and immobilization as the only effective forms of conservative therapy. Both generally and specifically, he condemns physical therapy, traction, and manipulation as treatment for lumbar disc lesions. The regimen based on flexion, advocated by Williams and others in this country as a conservative approach to certain lumbar disc lesions, is not mentioned; and indeed, use of the flexed position at any time is disapproved. The only mildly positive reference to exercise is a brief statement that gentle spinal extension exercise may be used in the postoperative period.

Surgical technics are described and postoperative care is outlined in detail. Some of the operative findings and procedures are illustrated by colored plates. Postoperatively, rest in bed for at least three weeks is strictly required for the author's patients.

The bibliography is limited and incomplete. As a treatise on the lumbar disc problem in general, this book may have some interest to the physiatrist. It has little to offer, however, in regard to conservative treatment. *(Gordon M. Martin, M.D.)*

PRACTICAL ELECTROCARDIOGRAPHY. Second edition. By *Henry J. L. Marriott,* M.D. Cloth. Price, $5.00. Pp. 226, with illustrations. The Williams & Wilkins Company, Mt. Royal & Guilford Aves., Baltimore 2, 1957.

This is a revised and augmented edition of a very well-received first edition of this book which had two reprintings. The author has made a calculated effort to achieve simplicity in a difficult and, to the uninitiated, a somewhat mysterious subject. As the title indicates the practical aspects of electrocardiography are paramount and the esoteric are minimal. Redundancies are avoided.

The author has prepared for the reader "file-card" type boxes of salient features of tracings in various conditions. Each one of these is an excellent precis of the text. In addition practical points are frequently listed in outline form as well as summaries and summarizations. As is stated in the preface, Dr. Marriott has been given a free and unconventional hand in arranging the layout of the pages. His unconventionality is manifest in that he does not feel it necessary that each page be filled. This undoubtedly increases the number of pages but is more than outweighed by increased readability and places the illustrative tracings closer to the descriptive text. There are over 140 illustrative or diagrammatic tracings in addition to 13 review tracings and 12 other figures. The review tracings are placed at the end of the last six chapters and serve as a cursory refresher course and as a stimulus to master what has gone before. It also is helpful to the reader that key words, phrases, or terms are set in bold type throughout the book.

This book is easily read and invaluable as an introductory course in electrocardiography for medical students, interns, residents, general practitioners, and even internists who do not practice cardiology. *(Bernard J. Doyle, M.D.)*

THE PHYSIOLOGY OF MAN. Second edition. By *L. L. Langley,* Ph.D., and *E. Cheraskin,* M.D. Cloth. Price, $6.95. Pp. 674, with illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, 1958.

This is an unusual textbook in physiology in that it presents a fairly comprehensive description of physiological processes, yet requires of the reader almost no prior knowledge of anatomy or chemistry. The combined presentation of anatomy and physiology, when they are essential for understanding, is particularly desirable for the elementary student. Although it is obviously impossible in a text at this level to present the several arguments on controversial subjects, the medical student or physician would require a more comprehensive approach. In spite of the somewhat simplified approach, the authors have generally avoided gross inaccuracies from over-generalization.

The volume deals frequently with the clinical implications of the physiology discussed; this undoubtedly adds to the interest of many readers but its inclusion is of doubtful advantage to the reader first approaching the understanding of physiologic processes. On the other hand, the rather thorough discussion of adaptations in exercise is an important part of normal physiology frequently neglected in some other physiology texts.

The book will find wide use in the training of various of the health professions, where a simple text is desired. For use in college physiology courses, its clinical emphasis may be undesirable. The illustrations and text layout are highly commendable. The clear chapter summaries and wise use of heavy type for new technical terms are examples of the excellence of organization. The general non-student reader will find the volume of value in enhancing his understanding of his own body's function. *(R. C. D., M.D.)*

Our nation now must learn to take advantage of the full potential of our older citizens — their skills, their wisdom, and their experience. We need these traits fully as much as we need the energy and boldness of youth.

— President Dwight D. Eisenhower

medical news

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before date of meeting.

Arde Bulova Memorial Fellowship

The creation and awarding of the Arde Bulova Memorial Fellowship in Rehabilitation by the World Rehabilitation Fund was recently announced by Howard A. Rusk, M.D., and General of the Army Omar N. Bradley. First recipient of the award is Dr. Alois Bruegger of Basel, Switzerland, who came to New York in January 1959, for a special six months' course in rehabilitation of paraplegic patients at the Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center. Upon completion of his training, Dr. Bruegger, a neurosurgeon, will be the medical director of a special paraplegia unit in the rehabilitation center at the Basel University Hospital.

Speaking at a luncheon in Basel at which announcement of the fellowship was made, General Bradley said, "Both the creation of the Arde Bulova Memorial Fellowship in Rehabilitation by the World Rehabilitation Fund and its being awarded to a physician from Switzerland are particularly significant tributes to the leadership of the late Mr. Bulova. Mr. Bulova had two primary interests. Both his own name and the name Switzerland are synonymous throughout the world with the first of these interests — fine watches. But equal to his concern for watches was his concern for the physically handicapped throughout the world and rehabilitation services to help them to help themselves."

One expression of the late Mr. Bulova's interest in rehabilitation is the Joseph Bulova School of Watchmaking established in 1945 to teach watch repairing to disabled veterans and more recently to disabled civilians. Operated at no cost to the disabled and without government subsidy of contribution, the school is designed so that the students have the ultimate in physical comfort. There are ramps for wheelchairs, electric-eye controlled doors, cork floors, complete medical facilities with a nurse and physician in daily attendance, an exercise room, recreation room, two motion picture projection rooms and innumerable other physical advantages. The modern curriculum and methods of instruction are adaptable to the disabled person's special needs and permit individual progress based upon ability and effort.

Since its founding in 1945, the school has graduated 532 physically handicapped graduates of an extensive 18 months' course in precision watch repairing. Although the Bulova Watch Company employs many physically handicapped persons, the graduates of the Joseph Bulova School of Watchmaking are encouraged to return to their home communities for employment. Since its opening, the Bulova School of Watchmaking has been supported by funds from the Bulova Watch Company Foundation. Its other rehabilitation activities have included support of many rehabilitation research and training projects.

Trained Professionals Offered Opportunities to Practice Skills in Service to the Blind

There is a growing need for professional workers in service to the blind. Expanded and improved programs require increased numbers of social workers, counselors, therapists, teachers, psychologists, vocational trainers, nurses, and other trained workers.

In an effort to encourage personnel already prepared in their own disciplines to enter service to blind persons, the Industrial Home for the Blind, in cooperation with the Office of Vocational Rehabilitation, is offering a 20-week training program designed to help trained persons to learn to apply their skills to service to the blind. Under this program, members of various professions are provided with field and didactic experiences, emphasizing the needs of blind persons and how these needs may be met by the various professions.

Each student spends full time in the program and receives a traineeship grant. Among the experiences provided is supervised field work conducted under individualized leadership by a member of the student's own discipline. In addition, students take graduate level courses provided under the sponsorship of a recognized local college. These basic experiences are supplemented by field visits, lectures on eye conditions, instruction in communications methods and skills of daily living,

and case conferences. The program is tuition-free.

All the facilities of the Industrial Home for the Blind are made available to students, including the Long Island Rehabilitation Center for Blind Persons, two special workshops, group and recreation program, low vision clinic, psychological laboratories, social work programs, nursery school, a specialized rehabilitation library, and a comprehensive community education program. Further details may be obtained by writing to Dr. Herbert Rusalem, Director of Professional Training, Industrial Home for the Blind, 57 Willoughby St., Brooklyn 1, N. Y.

Newly Registered Therapists

December 22, 1958

Army Medical Service School

Sevier, Caroline A., 84 Edwin Pl., Asheville, N. C.

Cleveland Clinic Foundation (Frank E. Bunts Educational Institute)

Badell, Joab, Jr., RR 1, Box 338, Knox, Ind.
Canan, Betty C., RD No. 2, Waynesburg, Pa.
Crisci, Daniel R., 560 2nd Ave., Long Branch, N. J.
Dombrowsky, Ruth Ann, 1680 Norfolk Dr., Birmingham, Mich.
Eckert, Beverly Ann, 250 Elm St., Lancaster, Pa.
England, Willa G., 1730 Tibbitts-Wick Rd., Girard, Ohio
Fordyce, Elizabeth R., RD No. 1, Hunker, Pa.
Gothot, Ann Marie, Liberty St., Dillonvale, Ohio
Hosmer, Norma E., 709 S. Chapel, Louisville, Ohio
Kaburick, Patricia Ann, 1821 Roxford Rd., East Cleveland, Ohio
Parr, Carol Ann, 5445 East Blvd., Canton, Ohio
Robbers, Diann L., 3207 Oakes, Everett, Wash.
Rust, Jack R., 23690 Effingham Blvd., Cleveland
Shirkey, William L., 1251 East Ave., Elyria, Ohio
Thompson, Barbara R., 5136 Edenhurst Rd., Lyndhurst, Ohio
Trivison, Frances Ann, 3971 Northampton Rd., Cleveland Heights, Ohio

New York University

Cline, Peter D., 61 Washington Ave., Hastings-on-Hudson, N. Y.

D. T. Watson School of Physiatrics

Bartlett, Brooks M., 563 W. Main St., Grafton, W. Va.
Bonesteel, Warren A., 118 Middle Ave., Saratoga Springs, N. Y.
Cobb, Dorothy, 250 Rockaway Ave., Boonton, N. J.
Fifer, Barbara Lee, Magee Rd., RD No. 1, Sewickley, Pa.
Fifer, Margaret Ann, Magee Rd., RD No. 1, Sewickley, Pa.
Fontana, Humbert A., Jr., 3602 Edison St., Alexandria, Va.
Hoffman, Barbara Ann, 134 Wolcott Dr., Youngstown, Ohio
Hood, Sally T., 430 Serpentine Dr., Pittsburgh
Jones, Donald G., 15 Maple Ave., Brookside, Bridgeport, Ohio
Keen, Ruth Ann, 306 Blue Rock Rd., Wilmington, Del.
Kennedy, Gladys J., RD No. 2, Box 54, Mars, Pa.
Knox, Walter L., 419 Wayne Ave., Ellwood City, Pa.
Lang, William F., 112 Louise Ave., Salisbury, Md.
Mason, Paul B., Box 85, Marlinton, W. Va.
Matrozza, Frank S., 75 Central Ave., Turtle Creek, Pa.
Meitner, Yvette S., 6244 Monitor St., Pittsburgh
Sander, Dawna Y., Box 635, Rt. 3, Clinton, Md.
Snee, Judith F., 948 Wall Ave., Pitcairn, Pa.
Spurdens, Helen R., 5924 Bingham St., Philadelphia
Sumner, Anne D., Pekin Rd., Newbury, Ohio
Torkeo, Arlene L., 2001 Ridge Ave., Arnold, Pa.
Ulrich, Frank T., Box 44, Mechanicsburg, Pa.
Wagner, Jill, 23 Greenhill Pkwy., Brattleboro, Vt.
Williams, Doris Ann, 5614 Fair Oaks St., Pittsburgh
Yatchum, John G., Roe Ave., Greensboro, Md.
Zimmerman, Joseph E., 306 Greenbrier St., Lewisburg, W. Va.

American Institute of Medical Climatology

On November 20, 1958, the American Institute of Medical Climatology, a non-profit organization, was officially formed in Philadelphia. The foundation of this Institute represents a pioneering effort in the field of medical climatology. Drawing on the professional capabilities of its members, many of whom are outstanding physicians, scientists and educators, the Institute sponsors a program of continuous research and education into all phases of the relationship between weather and human life.

Twelve sections implement the work of the Institute, namely, Sections on Medicine, Biology, Psychology, Air Pollution, Biostatistics, Institutional Planning, Industrial Planning, Atmospheric Electricity, Meteorology, Public Health, Medical Hydrology, and Engineering and Instrumentation.

Charter members of the Institute elected the following officers: George M. Piersol, M.D., President; Very Rev. James A. Donnellon, O.S.A., first Vice-President; Harold W. Schaefer, second Vice-President, and Igho H. Kornblueh, M.D., Secretary.

No Margin For Error

The American Medical Association and The American Hospital Association released a new film on hospitals and the law. The film, "No Margin For Error," was previewed by presidents and executives of allied hospital associations meeting at the midyear conference of the American Hospital Association.

"No Margin For Error" is one in a series of medicolegal films produced by The Wm. S. Merrell Company. The films, to be six in number, are made possible through the cooperation of the A.M.A. Law Department and the American Bar Association.

"No Margin For Error" presents one of the most pressing current problems in legal medicine, the cause and effect of human mistakes in the complex system of the modern hospital. Skillfully and candidly, case histories deal with major causes of in-hospital professional liability action.

Mix-up in patient identification, mistakes in blood bank procedure, and error in medication dosage are examples of problems the film reveals. It reports, based upon a recent study, that 45 per cent of all medication errors occur as a result of mistakes in patient identification.

The importance of the operating room sponge count procedure is demonstrated. One sees how 60-90 seconds can often make the difference between a correct count or a mistake and possibly legal action.

"No Margin For Error" points the way for active, thoughtful cooperation between medical and administrative staffs of the hospital. This film shows how a large number of incidents caused by human error can be effectively reduced.

"No Margin For Error" is a 16 mm. black and white optical sound film, running time, 30 minutes. Prints are available for loan from The Wm. S. Merrell Company, Cincinnati 15, Ohio, the American Medical Association or the American Hospital Association.

Specialists in Electro Medical Equipment for Physical Therapy, Rehabilitation and Diagnosis

ELCO

FRED LANDAUER CO.

11 BLENHEIM COURT
ROCKVILLE CENTRE, L. I., NEW YORK
Tel. RO 6-4527

THA

REPRESENTING LEADING MANUFACTURERS

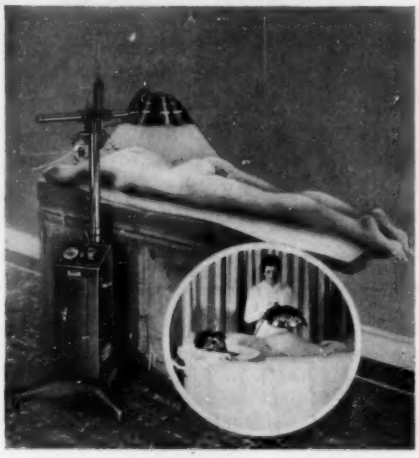
Dependable Repair Service

Liberal Trade-Ins

Consultant Service for planning new departments

We buy and sell Good Used Equipment

THE ORIGINAL FISCHERQUARTZ



Model No. 88

A MUST IN DERMATOLOGY
HIGH POWERED GERMICIDAL ULTRAVIOLET
FOR LOCAL SKIN THERAPY AND FOR
CONSTITUTIONAL EFFECTS

DUO-PULSATOR

PULSATING, SURGING AND TETANIZING currents available

R. A. FISCHER & CO.
517 Commercial Street
Glendale 3, California

fischer

SEND MEDICAL REPRINTS TO:

Name_____

Address_____

City_____ Zone____ State_____

(no obligation)

FISCHERTHERM • FISCHERSINE • FISCHERQUARTZ • PEDASINE • FISCHER ULTRA SOUND

Copies of

many back issues of

THE ARCHIVES

are still available.

•

For issues desired and prices,
write to

AMERICAN CONGRESS OF
PHYSICAL MEDICINE
AND REHABILITATION

•

30 North Michigan Avenue
Chicago 2, Illinois

---

now available . . .

without charge . . .

- "Employment Outlook for Physical Therapists: A Survey of Salary and Personnel Policies" by Augustin & Ehmann. (Reprint from August, 1957 Archives of Physical Medicine and Rehabilitation)
- American Registry of Physical Therapists: Booklet of Information.
- Guide Law: An Act Defining and Regulating Physical Therapy, etc.
- By-Laws of the American Registry of Physical Therapists.

WRITE REGISTRAR
AMERICAN REGISTRY OF PHYSICAL THERAPISTS
30 NORTH MICHIGAN AVENUE
CHICAGO 2, ILLINOIS

PHYSIATRIST

Position open for diplomate or eligible in comprehensive 100-bed rehabilitation center. Medical school affiliation. Opportunities for research and teaching. Primarily clinical practice without administrative duties. Financial arrangements open. Apply Director, Rehabilitation Institute of Metropolitan Detroit, 261 Brady St., Detroit 1, Mich.

WANTED — BOARD CERTIFIED PHYSIATRIST—for full-time hospital practice at Beckley Memorial Hospital, Beckley, West Virginia. Starting compensation $20,000. Progressive pay scale. For details address: The Clinical Director, Miners Memorial Hospital Association, 1427 Eye Street, N.W., Washington 5, D. C.

PHYSIATRIST

Position open for director of 5 year research program. Physiatrist with executive experience or ability would be most suitable candidate. Program involves supervising a home care program team. Opportunities for research and teaching. Write giving full details to: Joseph B. Rogoff, M.D., Director of P.M.R., Jewish Chronic Disease Hospital, 86 E. 49th St., Brooklyn 3, N. Y.

Expansion program necessitates increasing present physical therapy staff of 8. Three full-time physiatrists provide medical supervision. Excellent starting salary and fringe benefits commensurate with experience. Educational opportunities, both clinical and didactic, are excellent. Good opportunities for advancement. Overtime paid for any work in excess of 5 day, 40 hour work week. Write Director of Medical Services, Institute of Physical Medicine and Rehabilitation, 619 N. Glen Oak Avenue, Peoria, Illinois.

Portable
ULTRASONIC
Generator

1. Federal Communications Commission Type approval No. U-153
2. Underwriters' Laboratories Approval
3. Genuine Quartz Crystal of five square centimeters
4. Output up to fifteen Watts, total
5. Intensity selected on Indexed Rotary Switch with steps of 0.2, 0.5, 1.0, 1.5, 2.0 and 3.0 Watts per square centimeter, each of which is calibrated.
6. Handle for easy carrying and wrap-around for cables
7. Bracket furnished for wall mounting
8. Cabinet also fits standard size Mobile Utility Stand
9. Cabinet dimensions: 16⅝" long, 10" deep, 5¾" high
10. Weight 28 pounds

H. G. Fischer & Co.

Franklin Park, Illinois

OPPORTUNITIES AVAILABLE

WANTED: PHYSICAL THERAPISTS: (a) To serve as chief or staff; department directed by Board physiatrist; 600-bed general community hospital; Pennsylvania. (b) To head department, 500-bed general hospital; attractive city outside U.S.; climate delightfully equable. (c) Staff; 300-bed hospital, well equipped department serves 40 patients daily; university town, South. (d) Preferably man to head department, 22-man group; town, 100,000 near several large cities; Mid-South. (e) Male; rehabilitation treatment program under medical supervision; new million and a half wing recently placed in operation; large teaching hospital; staff of 35 physical therapists; preferably man with degree able to handle administration of department under medical director; $7000. (f) To take charge of department, crippled children's hospital; preferably one who enjoys working with children; will work under guidance of chief surgeon; large city, South. For further information regarding these opportunities, please write Burneice Larson, Medical Bureau, 900 North Michigan, Chicago.

WANTED

Registered Physical Therapist, preferably female, for staff of 450 bed hospital; 5 day week, wide variety of cases, liberal vacation and sick leave policy, laundry furnished. Salary open. Apply Personnel Office, Lancaster General Hospital, 525 North Duke Street, Lancaster, Pennsylvania.

FOR SALE

Ten year oil and gas leases issued by the State of New Mexico on State owned lands in areas where new wells are now drilling. Price $7.50 per acre in multiples of 40 acres or more.

OFFERING CIRCULAR ON REQUEST

PETROLEUM LEASE CORPORATION
1346 CONNECTICUT AVENUE, N.W.
WASH'NGTON, D. C.

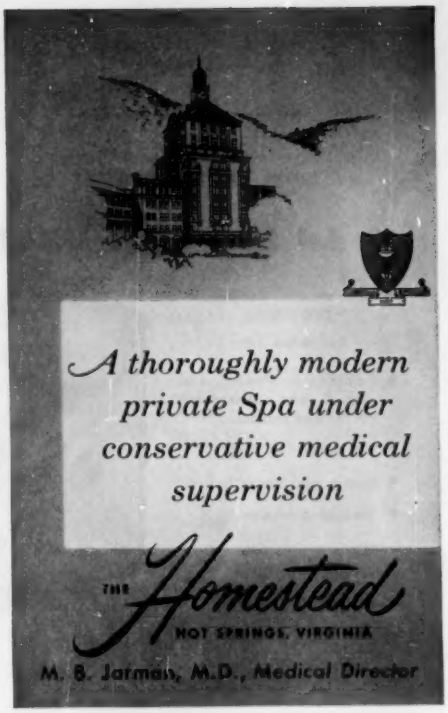
GRADUATES OF APPROVED SCHOOLS FOR PHYSICAL THERAPISTS
for
California State Hospitals
Veterans' Home
Schools for Handicapped

•

Registration with
California Medical Board required

No experience needed to start at $415 in mental hospitals and Veterans' Home; promotional opportunities to $530. Streamlined examinations twice a month in San Francisco and Los Angeles

STATE PERSONNEL BOARD
801 Capitol Avenue, PT 70
Sacramento, California


A thoroughly modern private Spa under conservative medical supervision
THE Homestead
HOT SPRINGS, VIRGINIA
M. B. Jarman, M.D., Medical Director

Enables AMPUTEES TO DRIVE

With EASE and SAFETY

Anyone unable to drive due to loss of hands, arms or legs, rheumatism or arthritis can drive again with the use of this new mechanical hand control for cars.

— Guaranteed —

Approved By
STATE HIGHWAY COMMISSIONS

Write for Information
THE LEVERAGE HAND BRAKE COMPANY
P. O. BOX 853 **FARGO, NORTH DAKOTA**

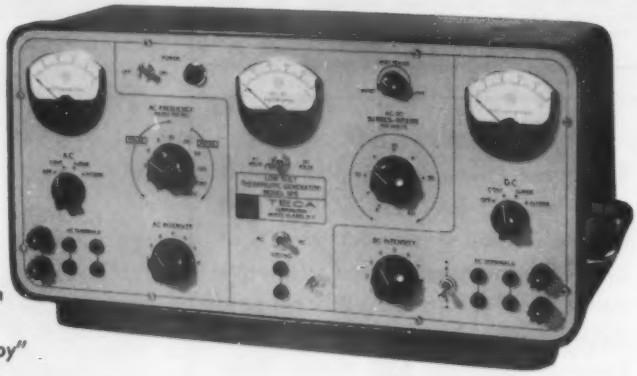
TECA
CORPORATION

- Two independent generating sections, separate circuits for AC stimulation and DC therapy, may be used simultaneously.
- Variable frequencies: 11 calibrated frequencies allow choice for maximum comfort and most effective stimulation.
- Easy-to-operate control panel uses simplified modern terminology.
- Automatic current surges and interruptions; rates adjustable over a wide range.

Model SP5: LOW VOLT THERAPEUTIC GENERATOR

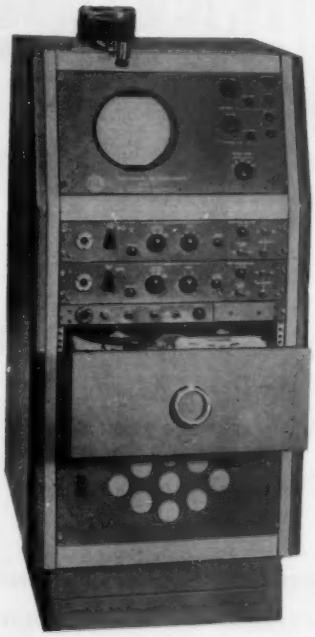
providing currents for:

- Comfortable stimulation of normal and denervated nerves and muscles.
- Ion transfer therapy.
- Muscle and nerve testing.
- Medical galvanism.



Write for SP 5 Bulletin and pamphlet, *"Notes on Low Volt Therapy"*

TECA CORPORATION • 80 MAIN STREET • WHITE PLAINS, N. Y.



complete integrated facilities for

ELECTROMYOGRAPHY

- SINGLE CHANNEL EMG — Model TE 1.2-7 — with two-channel magnetic tape recorder for recording notes and EMG simultaneously.
- TWO-CHANNEL EMG — Model TE 2-7 — permits simultaneous recording and study of two EMG potentials or of one potential together with a related physical parameter such as force or pressure.

• Automatic controls and new circuits provide simplified reliable operation without shielded rooms in most locations. • EMG potentials faithfully reproduced by special recorder circuits. • Specifications equal or surpass requirements for research, teaching and clinical use.

- *NEW rugged COAXIAL NEEDLE ELECTRODE withstands autoclaving, has tapered shaft with 26 gauge tip and insulated handle.*

TECA
CORPORATION

80 Main St.
White Plains
New York

IF YOU ARE

. . . . . a clinician
. . . . . a research worker
. . . . . a physiologist
. . . . . a bio-physicist
. . . . . a teacher of physical medicine and rehabilitation

IF YOU WANT

. . . . . to stay abreast with what is new in physical medicine and rehabilitation

YOU MUST

. . . . . read the **Archives of Physical Medicine and Rehabilitation,** the official journal of the American Congress of Physical Medicine and Rehabilitation and the American Academy of Physical Medicine and Rehabilitation

. . . . . no other medical periodical gives you as broad a coverage in the field of physical medicine and rehabilitation . . . each month you will find in this journal informative articles on new developments, theories and practices dealing with all phases of this specialty

YOU ARE INVITED

. . . . . to send in your subscription today. Sample copy will be sent on request. Subscription price $7.00 per year; Canada, $8.00; elsewhere, $14.00 the year. Bill later if you wish. Return the coupon with your instructions.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION,

30 No. Michigan Ave., Chicago 2.

Please find enclosed check for $7 ☐ or bill me ☐ for one year's subscription to the ARCHIVES.

Name_____

Address_____

City, Zone and State_____

You are invited
to
make application to present

A SCIENTIFIC PAPER, EXHIBIT OR FILM
AT THE

37th Annual Session
of the
American Congress of
Physical Medicine and Rehabilitation

Minneapolis • Hotel Leamington
August 30 - September 4, 1959

Please check one or any of the following. Upon receipt of this preliminary information form, official application blanks will be sent to you. The decision of the Program Committee for the 1959 session covering any portion of the meeting will be final.

☐ I wish to present a scientific paper; the tentative title is_____

_____

_____

☐ I wish to present a scientific exhibit; the tentative title is_____

_____

_____

☐ I wish to present a scientific film; the tentative title is_____

_____

_____

SIGNATURE_____ _____
(Please Print Your Name Here)

ADDRESS_____
(Please Print)

DATE_____

American Academy of Physical Medicine and Rehabilitation

Officers and Committees

1959

Officers

President — Louis B. Newman
President-Elect — Clarence W. Dail
Vice-President — Ray Piaskoski
Secretary — Harriet E. Gillette
Treasurer — James W. Rae, Jr.
Executive Secretary — Dorothea C. Augustin

Board of Governors

Robert W. Boyle
Clarence W. Dail
Harriet E. Gillette
Morton Hoberman
Louis B. Newman
Max K. Newman
Ray Piaskoski
James W. Rae, Jr.
George D. Wilson

Advisory Committee for Advancement of Physical Medicine and Rehabilitation

Donald A. Covalt, *Chairman*
Frances Baker
Herman J. Bearzy
Hans J. Behrend
Gusta Davidsohn
Donald J. Erickson
Murray B. Ferderber
Herman J. Flax
Everill W. Fowlks
Frank J. Schaffer
Samuel S. Sverdlik
Bror S. Troedsson
Harry T. Zankel

By-Laws

Robert W. Boyle, *Chairman*
Ralph E. DeForest
Shelby G. Gamble
Glenn Gullickson, Jr.
Gordon M. Martin
Herman L. Rudolph
Joseph N. Schaeffer
Dorothea C. Augustin, *Ex-officio*
F. Manley Brist, *Ex-officio*

Committee on Committees

Robert C. Darling, *Chairman*
Folke Becker
Arthur C. Jones
Joseph B. Rogoff
David Rubin
Jerome Weiss

Economics in Private Practice

Arthur A. Rodriquez, *Chairman*
Nila Kirkpatrick Covalt
Lee B. Greene
Isadore Levin
Max K. Newman
Leonard J. Yamshon

Liaison with American Congress of Physical Medicine and Rehabilitation

George D. Wilson, *Chairman*
Carrie E. Chapman
Fred B. Moor
Donald L. Rose

Liaison with American Hospital Association

H. Worley Kendell, *Chairman*
Harold Dinken
A.B.C. Knudson
Frank H. Krusen
Oscar O. Selke, Jr.

Liaison with Anesthesiology, Pathology, and Radiology

Joseph L. Koczur, *Chairman*
Robert C. Darling
James W. Rae, Jr.
Arthur L. Watkins
Ralph E. Worden
Walter J. Zeiter

Liaison with Association of American Medical Colleges

Charles D. Shields, *Chairman*
Joseph G. Benton
Herbert Kent
Frederic J. Kottke
George M. Piersol
Jerome S. Tobis
Peter A. Volpe

Liaison with Electromyography, Ultrasonics, and Mechanotherapy

William Bierman, *Chairman*
O. Leonard Huddleston
George H. Koepke
William D. Paul

Membership

Sedgwick Mead, *Chairman*
Edward M. Krusen, Jr.
Lewis A. Leavitt

Nominating

Glenn Gullickson, Jr., *Chairman*
A.B.C. Knudson
Edward W. Lowman

Program

Joseph G. Benton, *Chairman*
Miland E. Knapp
Charles D. Shields

Research in Orthetics and Prosthetics

Bruce B. Grynbaum, *Chairman*
Arthur S. Abramson
Robert L. Bennett
George G. Deaver
Roy H. Nyquist
Herbert W. Park
Odon F. von Werssowetz
Charles S. Wise

Members

Standing Committees of the

American Congress of Physical Medicine and Rehabilitation

1959

Advances in Education

Robert W. Boyle, *Chairman*
Harriet E. Gillette
Miland E. Knapp
Harold N. Neu
Elias M. Throne

Awards for Scientific Exhibits

David M. Paul, *Chairman*
Herman J. Bearzy
Donald J. Erickson
John H. Kuitert
Joseph B. Rogoff

Balneology and Health Resorts

Igho H. Kornblueh, *Chairman*
Charles H. Flint
Boris J. Paul
Edward P. Reese
Edwin Smith

Chronically Ill and Aged

Joseph N. Schaeffer, *Chairman*
Murray B. Ferderber
Edward W. Lowman
Leo Rosenberg

Constitution and By-Laws

Richard T. Smith, *Chairman*
Earl C. Elkins
John H. Kuitert
Robert C. Darling, *Ex-officio*

Cooperation with Air Force, Army, Navy, Public Health and Veterans Administration

Walter J. Treanor, *Chairman*
Robert V. Miller, Jr.
Arthur E. White
A.B.C. Knudson, *Ex-officio*

Cooperation with Food and Drug Administration

Thomas P. Anderson, *Chairman*
Kenneth C. Archibald
Leo Dobrin
Lucile M. Eising
Donald J. Erickson
Rex O. McMorris
David Rubin
Frederick J. Sheffield
George C. Twombly

Correlation of Physical Medicine and Psychiatry

Daniel Dancik, *Chairman*
Allen W. Byrnes
A. Ray Dawson
Lucile M. Eising
Anita M. Isaac
Frazer Parry
William C. Schaefer

Essay Award

(ACPM&R Annual Essay Award and Bernard M. Baruch Essay Award)

George D. Williams, *Chairman*
Frederic T. Jung
Gordon M. Martin
Fred B. Moor
George M. Piersol

Ethics

George H. Koepke, *Chairman*
Louis P. Britt
E. C. Christensen
Maxwell D. Flank
Robert M. Krout

Finance

Louis B. Newman, *Chairman*
Everill W. Fowlks
George C. Twombly
Frank H. Krusen, *Ex-officio*

Foster, Encourage and Coordinate Research Projects

Joseph Goodgold, *Chairman*
David I. Abramson
Harvey E. Billig, Jr.
Ralph E. DeForest
Bror S. Troedsson

Gold Key Award

Donald A. Covalt, *Chairman*
Donald J. Erickson
Louis B. Newman
Charles D. Shields
Jerome S. Tobis

Implementation of Departments of Physical Medicine and Rehabilitation in Medical Schools

Joseph G. Benton, *Chairman*
Arthur S. Abramson
James W. Rae, Jr.
William C. Schaefer

Legislation

Bruce B. Grynbaum, *Chairman*
Harold Dinken
Sherburne W. Heath, Jr.
Donald L. Rose
Oscar O. Selke, Jr.
Paul A. Shea
Charles S. Wise

Medical Auxiliary Services Related to Physical Medicine and Rehabilitation

Robert V. Miller, Jr., *Chairman*
Herman J. Bearzy
Donald A. Covalt
Harold Dinken
George M. Piersol
Arthur A. Rodriquez
Bror S. Troedsson

Medical Economics

Arthur A. Rodriquez, *Chairman*
Herman J. Bearzy
Joseph E. Cox
S. Malvern Dorinson
Lee B. Greene
Edward M. Krusen, Jr.
William J. La Joie
Nicholas D. Mauriello
Herman L. Rudolph
Paul A. Shea
Leonard J. Yamshon

Meeting Place

Walter J. Zeiter, *Chairman*
Morton Hoberman
H. Worley Kendell
Howard F. Polley
Keith Stillwell
Dorothea C. Augustin, *Ex-officio*

Membership

Otto Eisert, *Chairman*
Hilda B. Case
Carrie E. Chapman
Robert F. Dow
Herbert Kent
Gustave Gingras

Memorials and Lectureships

Frederic T. Jung, *Chairman*
Clarence W. Dail
Wm. Benham Snow

Nominating

Donald L. Rose, *Chairman*
Robert W. Boyle
Miland E. Knapp
A.B.C. Knudson
Jerome S. Tobis

Orthezes and Prostheses

Arthur S. Abramson, *Chairman*
Charles O. Bechtol
William J. Erdman, II
Harold W. Glattly
Odon F. von Werssowetz

Private Practice

Lee B. Greene, *Chairman*
S. Malvern Dorinson
Sherburne W. Heath, Jr.
David Siegel

Program

Everill W. Fowlks, *Chairman*
Harvey E. Billig, Jr.
Albert L. Cooper
Glenn Gullickson, Jr.
Milton Lowenthal
William J. O'Rourke
Jerome S. Tobis
Walter J. Zeiter
Dorothea C. Augustin, *Ex-officio*

Public Relations

Ralph E. Worden, *Chairman*
Ernest F. Adams
Herman L. Rudolph

Rehabilitation Centers

Nila Kirkpatrick Covalt, *Chairman*
Herman J. Flax
Gustave Gingras
O. Leonard Huddleston
Kenneth S. Landauer
Justus F. Lehmann
Edward W. Lowman
Frazer Parry
Constantine G. Psaki
Juan Jose Quezada
Jack Sokolow
Arthur E. White
Ralph E. Worden

REGIONAL OFFICERS

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

EASTERN SECTION — Chairman, Isadore Levin, Washington 6, D. C.; Secretary, W. Theodore Liberson, State of Connecticut Veterans Home and Hosp., West St., Rocky Hill, Conn.

States represented: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and (District of Columbia).

MIDWESTERN SECTION — Chairman, Harold N. Neu, Omaha; Secretary, Adeline B. Gauger, VA Center, Wadsworth, Kans.

States represented: Colorado, Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin and Wyoming.

WESTERN SECTION — Chairman, Robert V. Miller, Jr., Los Angeles; Secretary, Carrie E. Chapman, Chief, Physical Medicine and Rehabilitation, VA Hospital, 13th and Harrison Sts., Oakland, Calif.

States represented: Arizona, California, Utah and Territory of Hawaii.

NORTHWESTERN SECTION—Chairman, Duane A. Schram, Winslow, Wash.; Secretary, Sherburne W. Heath, Jr., 757 Medical-Dental Bldg., Seattle.

States represented: Idaho, Montana, Oregon and Washington.

CENTRAL SECTION — Chairman, Rex O. McMorris, Louisville, Ky.; Secretary, Richard F. Baer, 1213 Elco Dr., Maumee, Ohio.

States represented: Indiana, Kentucky, Michigan, Ohio, Virginia and West Virginia.

SOUTHERN SECTION — Chairman, Herbert W. Park, Richmond, Va.; Secretary, Solomon Winokur, 4729 Prytania St., New Orleans.

States represented: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee and Texas.

Announcing . . .

The Sixth Essay Award

sponsored by the

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

To stimulate interest in the field of physical medicine and rehabilitation, the American Congress of Physical Medicine and Rehabilitation will award annually, a prize for an essay on any subject relating to physical medicine and rehabilitation. The contest, while open to anyone, is primarily directed to interns, residents, graduate students in the pre-clinical sciences and graduate students in physical medicine and rehabilitation. The Essay Award Committee suggests that members of the American Congress and American Academy of Physical Medicine and Rehabilitation bring this announcement to the attention of interested persons. The following rules and regulations apply to the contest:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than March 2, 1959.

3. Contributions will be accepted from interns, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200.

8. The winner shall be determined by the Essay Award Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Essay Award Committee, no contribution is acceptable. Announcement of the winner will be made at the annual meeting.

BERNARD M. BARUCH ESSAY AWARD—*ii*

Sponsored by the

AMERICAN CONGRESS of PHYSICAL MEDICINE AND REHABILITATION

An annual award of $100 will be given as a prize for an essay on any subject relating to physical medicine and rehabilitation. The following rules and regulations apply:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than March 2, 1959.

3. *Contributions will be accepted from medical students only.*

4. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the *Archives of Physical Medicine and Rehabilitation.*

5. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

6. The essay must not have been published previously.

7. The winner shall receive a cash award of $100.

8. The winner shall be determined by the Essay Award Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced. The winning manuscript becomes the exclusive property of the American Congress of Physical Medicine and Rehabilitation.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Essay Award Committee, no contribution is acceptable. Announcement of the winner will be made at the annual meeting.

3rd International Congress of Physical Medicine

IIIe Congres international de Medecine Physique

3° Congreso internacional de Medicina Fisica

3. internationalen Kongress für Physikalische Medizin

PATRON

The Honorable Richard Nixon

The Vice President of the United States

PATRONESS

Mrs. Richard Nixon

Week of

August 21, 1960

WASHINGTON, D. C., U.S.A.

Preliminary information regarding this meeting may be had from the Office of the Secretary General
WALTER J. ZEITER, M.D., or from the Executive Secretary, DOROTHEA C. AUGUSTIN,
30 North Michigan Avenue, Chicago 2, Illinois.